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Services and Manufacturing Linkages: An Empirical Analysis for Lao PDR

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Acronyms and abbreviations

AFAS	ASEAN Framework Agreement on Services
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of South East Asian Nations
BPO	Business Processing Outsourcing
CAGR	Compound Average Growth Rate
CMT	Cut Make Trim
EAP	East Asia and the Pacific
FDI	Foreign Direct Investment
FOB	Free on Board
GATS	General Agreement on Trade in Services
GDP	Gross Domestic Product
GTAP	Global Trade Analysis Project
HHI	Herfindahl-Hirshman Index
ICT	Information and Communication Technologies
ISIC	International Standard Industrial Classification
NEC	Not Else Classified
NSEP	National Five Year Socio Economic Plan
OBM	Original Brand Manufacturing
OBS	Other Business Services
ODM	Original Design Manufacturing
R&D	Research and Development
RCA	Revealed Comparative Advantage
SAM	Social Accounting Matrix
SME	Small and Medium Enterprises
SSA	Sub Saharan Africa
STRI	Services Trade Restrictiveness Index
TFP	Total Factor Productivity
UNCTAD	United Nations Conference on Trade and Development
USD	United States Dollars
VA	Value Added
WDI	World Development Indicators
WTO	World Trade Organization

Currency Equivalent

Exchange rate effective as of February 24, 2016 (from BCEL):

Currency Unit = LAK (Lao Kip)

LAK 8,110 = US\$ 1.00

Fiscal Year = October to September

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Disclaimer: The findings, interpretations and conclusions expressed herein are those of the authors, and do not necessarily reflect the views of the World Bank Group, its Executive Directors, or the governments they represent.

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Executive Summary

1. *This report seeks to shed light on the ways in which the services sector has contributed to Lao PDR's competitiveness and integration into the global marketplace. It focuses on two complementary roles that the services sector plays: first, as an avenue for export diversification and growth and, second, by providing inputs into other productive sectors of the economy, such as the manufacturing sector. As economies grow, the importance of the services sector generally increases, but its role as an enabler of other sectors of the economy in moving up the value chain is frequently overlooked. However, the services sector is critical in raising competitiveness of these other sectors to boost growth and create better quality jobs.*

2. **Lao PDR's services sector has made a significant contribution to economic growth over the past decade, but it remains below its full potential.** The services sector has grown rapidly in recent years, becoming the largest contributor to Lao PDR's GDP. Nevertheless, the size of the services sector—at 41 percent of GDP in 2014—remains smaller than other countries' services sectors at similar levels of development.

3. **While services exports have grown considerably, they remain concentrated in traditional services, particularly transport and travel.** Services exports grew from 6.4 percent of total services output in 2005 to 6.9 percent in 2013. However, the high reliance on a few traditional segments makes Lao PDR's services export basket the most concentrated among its peers, adding to the economy's vulnerability to sector-specific shocks.

4. **As a result of the inadequate supply of modern services, not only does their direct contribution to exports remains low, but so does their indirect contribution that is embedded in manufacturing exports.** Almost 90 percent of the services inputs used by manufacturers come from distribution and transport, while modern services, such as business, financial, insurance and ICT services, contribute very little to manufacturing value-added. Normally, services sector firms are important suppliers of intermediate inputs to other sectors, especially manufacturing firms. When taking these forward linkages into account, the total contribution of services stands at 21 percent of total exports in Lao PDR. Nonetheless, the contribution of modern services in value-added exports remains very small. Inadequate supply of financial and telecommunication services—representing only 3 percent of total services inputs to manufacturing—may also be a constraint on the diversification and upgrading of manufacturing firms, preventing them from moving up the value chain.

5. **The linkages between services and manufacturing are weaker than in peer countries.** Services only contributed about 28 percent of the economy's inputs in terms of value-added in 2011, a low share by international standards, with services in peer countries contributing close to, or well over, 40 percent. Instead, agriculture, energy and minerals contributed 68 percent of domestically supplied inputs, while manufacturing contributed just 6 percent. In Lao PDR, services are used more as inputs for manufacturing exports than as inputs

for manufacturing products for the domestic market. Both for export-oriented and for domestic activities, Lao PDR's manufacturing sector relies less on services inputs than peer countries.

6. Improving the quality and range of services is crucial in achieving economy-wide gains in productivity and competitiveness. The inadequate supply of services inputs in Lao PDR acts as a tax on the production of goods that use such services. Our findings suggest there are significant links between the quality of backbone services and firms' productivity in Lao PDR, as well as in other countries in the EAP region. Lao PDR firms' performance is particularly adversely affected by the poor quality of transport and electricity services. Challenges with transportation services have negative impacts on productivity, according to our results. Less conclusive evidence is found regarding the limited access to financial services and negative impacts on productivity. While the most productive firms tend to also be more vocal about the inadequate supply of financial services, when looking at objective measures of access to finance we find that firms with greater access to bank financing tend to be more productive.

Policy Recommendations

7. The main policy recommendations that emerge from this report are aimed at increasing competition in the services sector, reducing distortive regulations, and opening up the sector to foreign participation, building up skills, both at the individual and at the firm level, and investing in hard and soft infrastructure to promote the development of the sector. In particular, greater attention is needed in the following areas:

8. Move forward with the implementation of WTO and AFAS commitments to ensure a liberalized trade and investment regime for services.

- **Openness in the services sector:** This is part-and-parcel of a comprehensive growth-enhancing trade policy. Nonetheless, Lao PDR's commitments under GATS feature relatively low sectoral coverage and shallow obligations. There is some urgency for Lao PDR to move ahead with its commitments in the financial and telecomm segments, and to consider opening up the distribution and retail segments. Restrictions on foreign firms' entry into several tourism activities, for example guest houses, are still in place. In transport, adding flexibility in licensing procedures would help firms that may prefer to integrate this activity into their core business, for example in the mining sector.
- **Regional liberalization commitments (with AFAS) need to be made compatible with multilateral ones (with GATS/WTO).** Regional integration in services could potentially be a platform for wider integration with the global marketplace. However, while Lao PDR has made greater progress towards liberalization in the regional setting, some inconsistencies still remain (e.g., approval requirements in the regional setting, but not at the multilateral setting; minimum foreign ownership requirements in the regional setting, but not in the multilateral setting, etc.). This suggests that trade negotiation strategies would be more effective if centralized, together with a stronger mechanism for consultation and coordination across line ministries.

9. Complement openness with sound regulatory reforms to help materialize the gains. In order to benefit from increased openness to trade and investment, it is necessary to have an

enabling, transparent and predictable regulatory environment. In telecommunications, for example, Lao PDR has committed to ambitious regulatory reforms. In order to achieve the benefits of this it is crucial for the country to move towards establishing an institutional and regulatory framework, in line with the WTO Telecom Reference Paper, that provides the principles and institutional requirements needed for the regulation of telecommunications. This must include aspects such as rules on access to and use of telecomm infrastructure, the independence of the regulatory body and rules on anti-competitive behavior. A draft Government Decree to this effect is currently (February 2016) under discussion.

10. Support the implementation of reforms in the services sector by empowering relevant agencies with adequate financial resources and skilled staff. Sound and transparent regulatory frameworks will yield few results if the capacity of institutions is not strong. Limited budgets and poorly trained staff constrain agencies' capacities to respond effectively to regulatory challenges. Furthermore, in order to support transparent implementation, it would be advantageous to design user-friendly guidelines on the main horizontal laws for both officials and the public to ensure a common understanding of the rules and regulations.

11. Support diversification of the economy by improving the stock of human capital. Building up skills is vital if Lao PDR is to move into more sophisticated services and manufacturing production. For example, in order to upgrade in textiles and garments, firms need to rely on a workforce that can undertake original design, accounting activities and marketing. The lack of skilled workers has been identified as a serious constraint by firms in Lao PDR. Targeted, long-term policies to strengthen basic education, reform curricula to meet market demand, and align vocational training with private sector needs, are crucial. In the short term, facilitating the entry of foreigners with relevant skills could temporarily alleviate some of these constraints.

12. Invest in hard and soft infrastructure, particularly in transport and energy, including electricity, water and internet connectivity. The development of the road network is vital in reducing transport costs, which play an important role in the cost equation of firms. In addition, energy distribution infrastructure (e.g., the power grid) needs to be strengthened to ensure stable supply. In terms of internet connectivity it is important to level the playing field between domestic and foreign providers of internet to increase competition and improve performance. Finally, eliminating the luxury tax on internet is in order.

Structure of the Report and Caveats

Two caveats are in order. First, the analysis of services value added dynamics and of services and manufacturing linkages relies on existing data on input-output linkages. These data is obtained from Lao PDR's most recent update of its input-output table, dating from 2002, with updates made on the basis of more recent data for comparable countries. Second, also related to data availability, the report analyzes linkages between manufacturing and services in the *formal sector*. Lack of data on the informal side of the economy, likely sizable in a less developed country such as Lao PDR, prevents us from tackling this portion of the economy. The reader should take these caveats in consideration when interpreting the results.

The structure of this report is as follows. Section II benchmarks Lao PDR's export performance of services, measured in gross as well as in terms of value added. Section III explores the role of services as inputs to Lao PDR's manufacturing sector by measuring the value-added linkages, for domestic production of manufacturing as well as exports. Section IV investigates the impact of services input provision on manufacturing productivity.

I. Assessment of Services Trade Outcomes

1. Services play a dual role for building export competitiveness in Lao PDR's economy. Services are not only a source of competitiveness as inputs into manufacturing and agriculture exports, but direct exports of services provide an opportunity for export diversification and can be used as an engine for economic growth. Many developing countries have benefitted from the expanding opportunities offered by new technologies to become strong exporters of modern services activities. These experiences, supported by empirical evidence, show that while services as inputs into other economic activities will remain an important determinant of economic performance in developing countries, these countries can also join the club of services exporters and benefit from opening of the services market.

2. Section II of the report explores the importance of the services sector for Lao PDR from the first role that services play: as an avenue of export diversification and growth. It addresses the following questions. First, how has the services sector performed in Lao PDR in terms of its contribution to the economy's GDP and employment, over time and compared to peer countries? Second, how have services exports performed in Lao PDR, both in gross terms, but also value added terms once considering that services contribute to other sectors' exports?

Box 1: Comparators of Lao PDR

Eight countries were chosen as comparators for Lao PDR. These include other regional peers of Cambodia, Thailand and Vietnam. Nepal, Bhutan, Botswana and Mongolia have been included as other land-locked countries, while Bangladesh is also an important exporter of garments. Lao PDR has achieved a somewhat greater level of development than Cambodia, but slightly below Vietnam. Thailand, Botswana and Mongolia have instead achieved substantially higher levels of economic development in terms of GDP per capita. Lao PDR's population is smaller than most comparators, with the exception of Bhutan, Botswana and Mongolia.

Table 1: Comparator country demographics, 2014

	GDP (billion USD)	GDP per capita	Population (millions)
Lao PDR	11.2	1,701	6.6
Cambodia	15.2	1,010	15.1
Thailand	387.3	5,741	67.5
Vietnam	171.2	1,909	89.7
Bhutan	1.8	2,360	0.8
Bangladesh	150.0	954	157.2
Botswana	15.0	6,882	2.2
Mongolia	12.5	4,388	2.9
Nepal	19.2	691	27.8

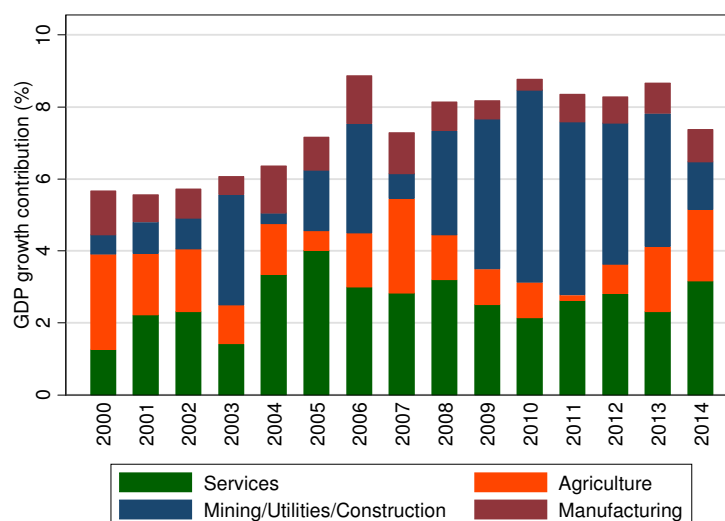
Source: World Bank World Development Indicators.

a. Services in the domestic economy

Lao PDR's services sector has contributed considerably to economic growth and structural change, to have become the most important contributor to GDP in Lao PDR. Nevertheless, the size of Lao PDR's services sector falls significantly below other countries at similar levels of economic development, as well as all peer countries with the exception of Bhutan.

3. Over the past decade, Lao PDR's services sector has contributed considerably to economic growth and structural change. Lao PDR's economy has been growing steadily and robustly since 2000. GDP has grown at about 8% since 2005, above rates achieved at the beginning of the decade at about 6% (Figure 1). All sectors of the economy –manufacturing, other industry (including mining, utility supply and construction), agriculture, and services – have contributed positively to GDP growth since 2000.¹ Other industry has been the largest driver of GDP growth, mostly notably due to the mining sector including copper, but the services sector has been responsible for over a quarter of GDP growth.

Figure 1: Sectoral contribution to growth, 2000 – 2014

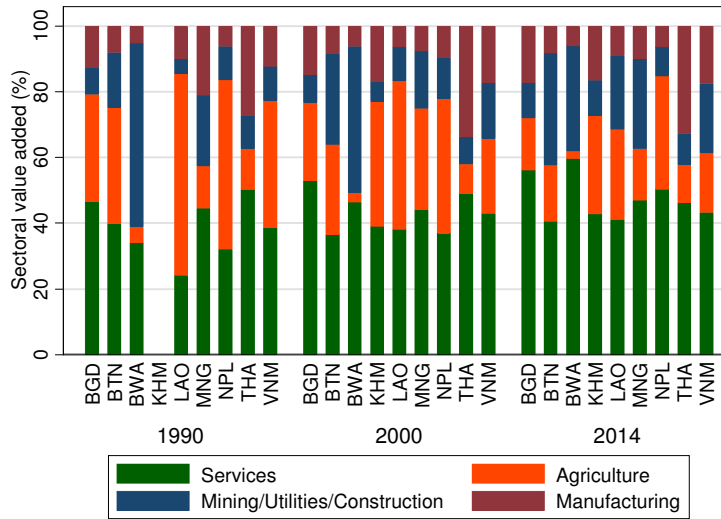


Source: Authors' calculations based on data from WDI

4. As a result of the sector's strong growth performance, services now contribute the largest share of GDP in Lao PDR. Other industry's share in economic activity increased from 11% in 2000 to 25% in 2013 (Figure 2). Mining has most likely been driving this change, but also construction. The share of manufacturing in GDP has increased only from 6% in 2000 to 8% in 2013. Services share in economic activity grew more modestly, from 38% in 2000 to slightly over 40% in 2014, but took over agriculture as the sector contributing most to GDP.

¹ The sectoral classifications follow ISIC rev. 3 and include: agriculture (ISIC 1-5), manufacturing (ISIC 15-37), other industry (10-14, 38-45), and services (50-99).

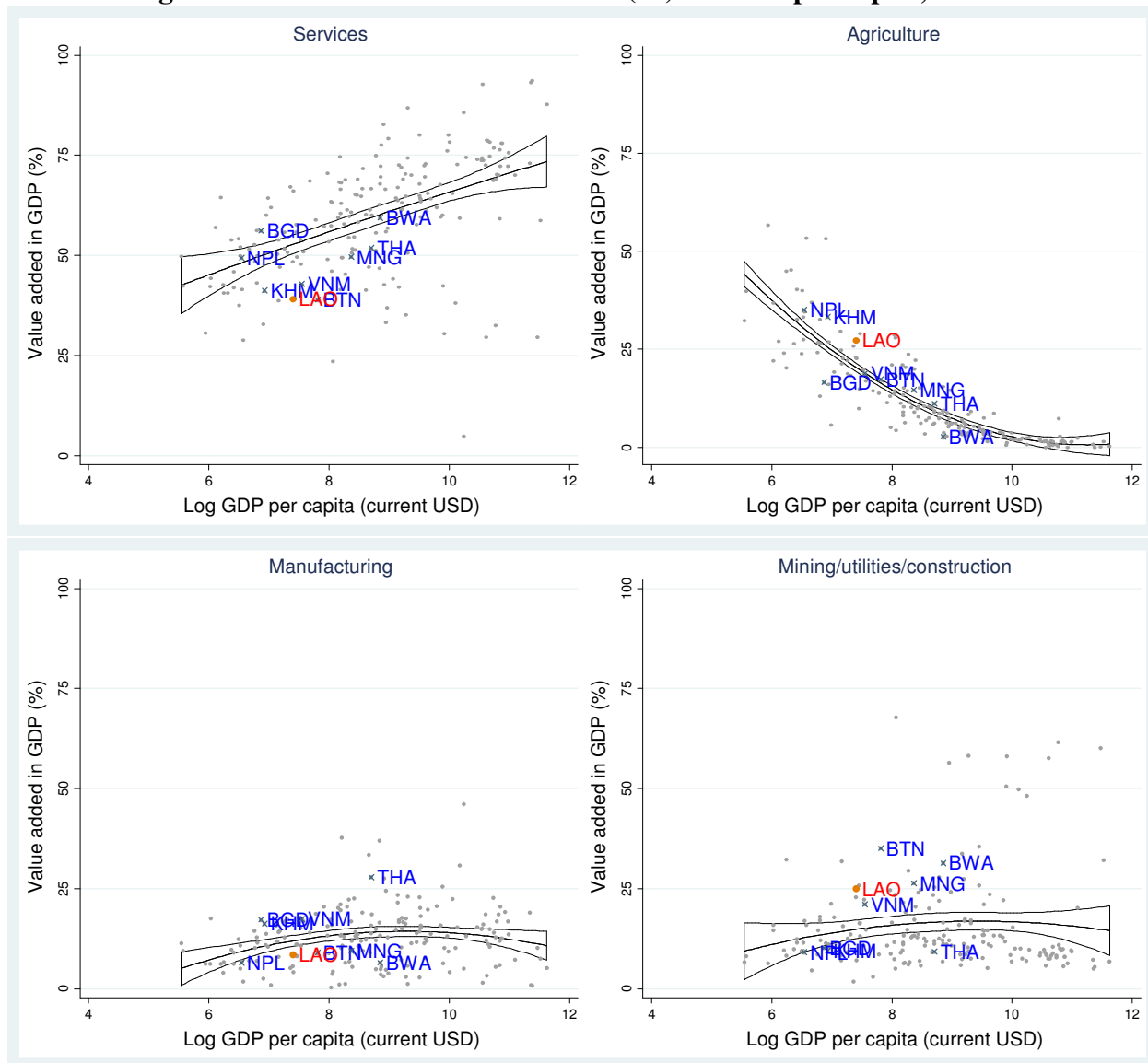
Figure 2: Sectoral value added shares, 1990, 2000 and 2014



Source: Authors' calculations based on data from WDI

5. Despite these achievements, services contribution to GDP is below expected levels. As countries become richer, the size of the services sector in the domestic economy tends to increase, though with dispersion around the trend. The linear relationship between GDP per capita and services share of value added in GDP has flattened slightly over time, though likely driven by select outliers. Nevertheless, the size of Lao PDR's services sector falls significantly below other countries at similar levels of economic development, as well as all peer countries with the exception of Bhutan (see Figure 3, where Lao PDR and many comparator countries are outside the 95% confidence intervals). The size of the services sector in Vietnam, Thailand, Cambodia, Mongolia and Bhutan also fall below expected levels. Bangladesh is the only comparator to outperform other countries at a similar level of economic development. The size of the manufacturing sector in Lao PDR also tends to underperform other countries at a similar level of economic development, while the agricultural sector and the mining/utilities/construction sector are above expected levels.

Figure 3: Services value added in GDP (%) vs. GDP per capita, 2012-14



Source: Authors' calculations based on data from WDI

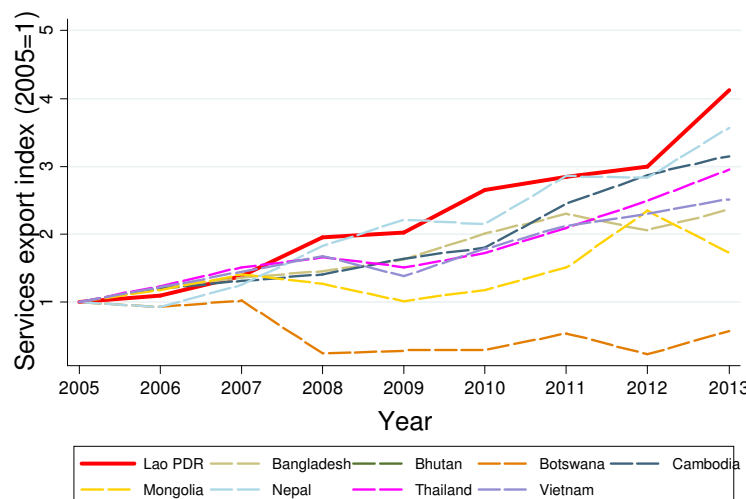
b. Gross exports of services

Lao PDR's expanding domestic services sector has translated into an expanding services export sector, with the recent export performance in services being strong among peer countries. Lao PDR's services export growth was mainly in 'traditional' as opposed to 'modern' activities – transport and travel comprise over 90% of the export basket. Communication services have also grown in value. This growth has allowed Lao PDR to maintain a comparative advantage in travel and communication services relative to other countries in the world.

i. Export growth

6. Lao PDR's expanding domestic services sector has translated into an expanding services export sector, with the recent export performance in services being strong among peer countries. Commercial services exports have grown 4-fold in value since 2005 (Figure 4).² Lao PDR's services export sector outpaced all other peer countries since 2005.

Figure 4: Commercial services export value index, 2005-2013



Source: Authors' calculations based on data from UNCTAD

Box 2: Four modes of services supply

Services have unique characteristics that greatly affect their tradability, including intangibility and non-storability, but they also typically require differentiation and joint production. In order to capture these aspects, the World Trade Organization defines trade in services to span four modes of supply:

- Mode 1, or cross-border trade, are services supplied from the territory of one country into the territory of another (for example, consultancies, market research, graphic design services).
- Mode 2, or consumption abroad, are services supplied in the territory of a nation to the consumers of another (for example, tourism, education, health services).
- Mode 3, or commercial presence, are services supplied through any type of business or professional establishment of one country in the territory of another, for example, foreign direct investment (FDI)
- Mode 4, or presence of natural persons, are services supplied by nationals of a country in the territory of another (for example, a consultant or a health worker supplying their services in the importing country).

Due to these characteristics, at-the-border duties cannot be applied to services, having resulted in much weaker measurement and accounting practices with considerable less accuracy. Thus services statistics have ample space for

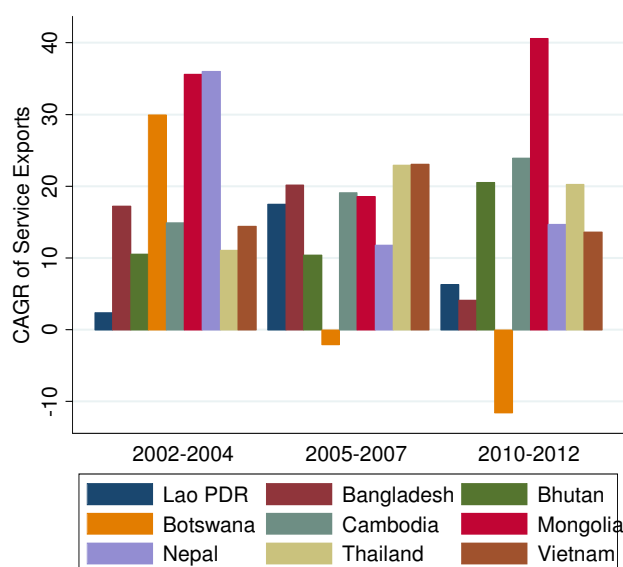
² Commercial services exports, defined as total services excluding government services, are used throughout this report (but we point out when only total services statistics are available). Services trade that takes place through FDI and temporary movement of people are not covered in these data. Commercial services are generally used to reflect the developments of the private services sector, as government services include embassies, consulates, military units, etc., as well as the transactions of international organizations. However, in some countries commercial services can be government/publically-owned, for example a national airline, and would thus be included in the report's statistics. In addition, the analysis of gross services trade focuses on cross-border transaction reported in balance of payments statistics, or modes 1 and 2. (See Box 2 for a description of the different ways, or modes, in which services can be traded.)

improvement in terms of measurement. In particular, with respect to modes 3 and 4, measurement is to date difficult and incomplete. Ongoing revisions and refinements of the Balance of Payments classification work towards solving these issues.

Gross services trade data that are used in the first and second component of this report capture cross-border trade (Mode 1) and consumption abroad (Mode 2). Services trade that takes place through FDI and temporary movement of people are not covered in these data. Rather, they are the focus of the analysis in the third component.

7. Services export growth was strongest in the years prior to the global crisis, but has slowed since. After having achieved the lowest growth of comparators between 2002 and 2004 at 2% per annum, Lao PDR's services exports grew robustly at an average of 18% per annum between 2005 and 2007 (Figure 5). This performance was similar to many peer countries, though Vietnam, Bangladesh and Thailand's export sectors all grew over 20% per annum. Between 2010 and 2012, Lao PDR's services export growth returned to relatively low levels when benchmarked against peer countries, at about 6% per annum.³

Figure 5: Commercial services export growth rate, 2002-2012



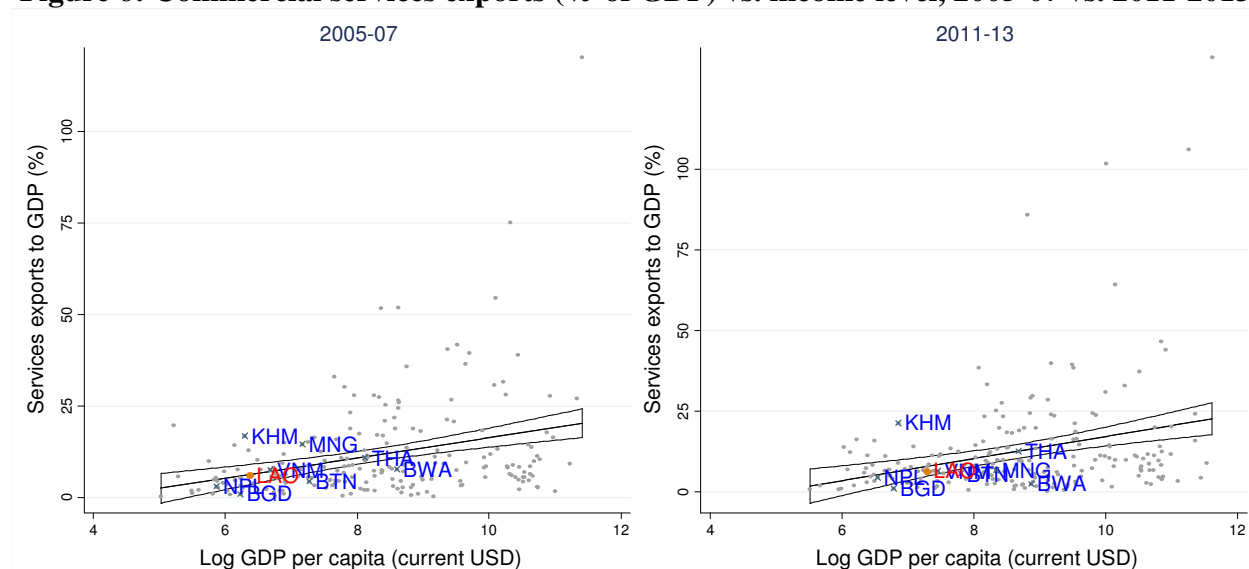
Source: Authors' calculations based on data from UNCTAD

8. The growth resulted in a higher export intensity of the sector. Services exports as a percentage of GDP — a measure of export intensity — are significantly and positively correlated with a country's level of economic development. Lao PDR's services export intensity increased from 6.4% in 2005 to 6.9% in 2013. The size of the export sector relative to economic activity is at expected levels given Lao PDR's level of economic development (Figure 6, where Lao PDR is inside the 95% confidence interval). Vietnam closely followed Lao PDR's performance at 7% of GDP. Among peer economies, Cambodia and Thailand achieved the highest export intensity, and are the only economy among comparators to reach a level above 10%. Although Cambodia's services export-to-GDP ratio deteriorated slightly between the periods 2005-2007 and 2011-2013, Thailand's services export-to-GDP ratio instead increased to 13.5% in the period 2011-

³ Botswana's services export sector has been contracting since the global financial crisis of 2008-09.

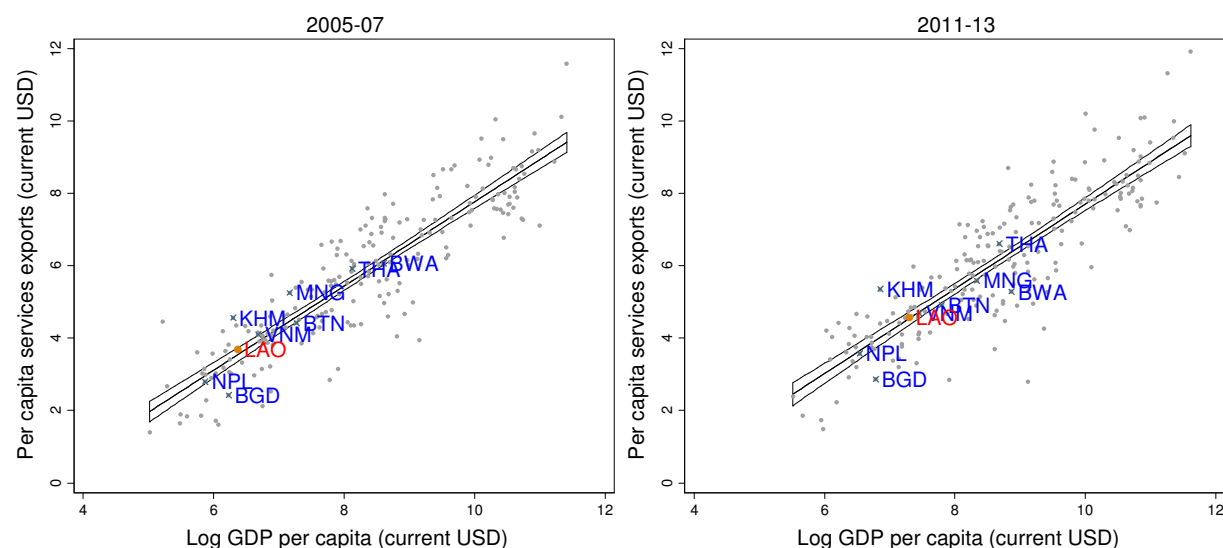
2013. In per capita terms, services exports are also at expected levels in Lao PDR (Figure 7, where Lao PDR lies on the regression line).

Figure 6: Commercial services exports (% of GDP) vs. income level, 2005-07 vs. 2011-13



Source: Authors' calculations based on data from WDI

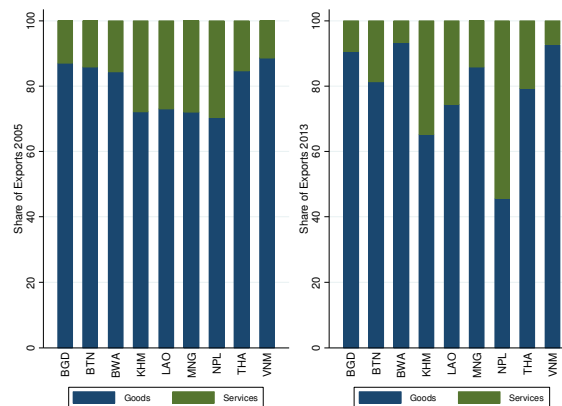
Figure 7: Per capita services exports vs level of development, 2005-07 vs. 2011-13



Source: Authors' calculations based on data from WDI.

9. Notwithstanding, Lao PDR's share of services in total exports has remained constant since 2003. Exports of services represented 26% of total exports in 2013, and has changed little since 2003 (Figure 8). This suggests that the export performance in goods trade has been equivalent to that of services trade for Lao PDR. This ratio is average relative to peer economies, though Nepal is an outlier where services comprise over 50% of total exports.

Figure 8: Share of services in total exports, 2005 vs. 2013



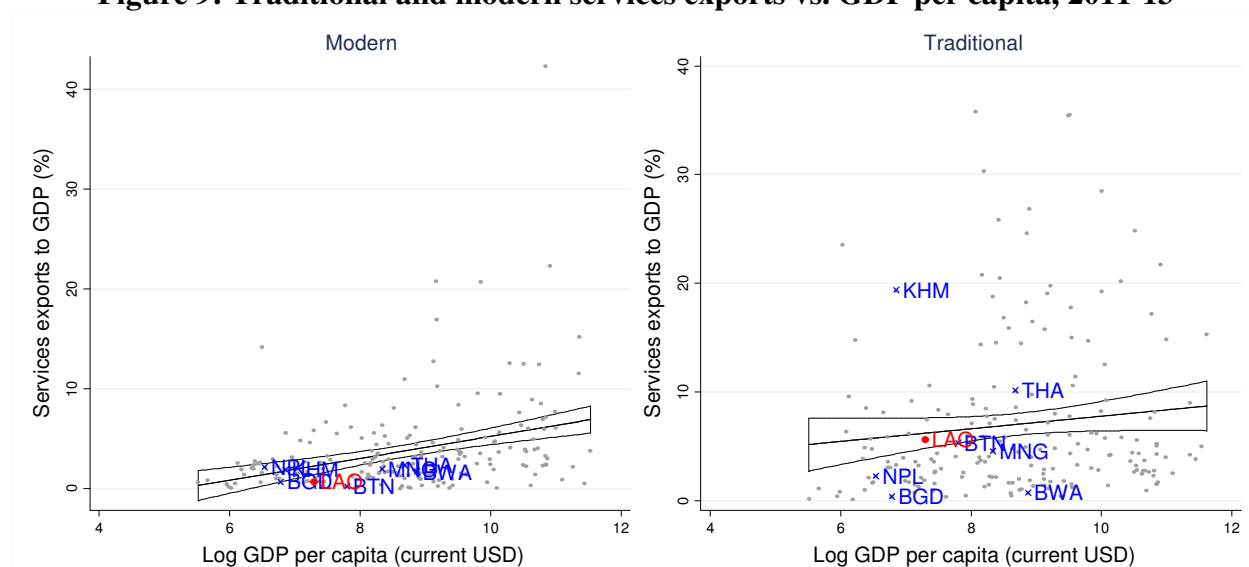
Note: Bhutan data for 2005 is from 2006
Source: Authors' calculations based on data from WDI

ii. Export composition

10. Lao PDR's services exports are heavily concentrated in 'traditional' as opposed to 'modern' activities. 'Modern services' are services that can be traded across borders without the buyer and seller being in the same place. Delivery of these services is less dependent on physical infrastructure and more dependent on telecommunications and electric supply. Examples of such services include communication, banking, insurance, business, and remote access services; transcription of medical records; call centers; and education. These services differ from 'traditional services', which demand face-to-face interaction. In addition to being important inputs into production, modern services exhibit higher productivity and generate high-skilled and better-paid jobs. However, many modern services sectors have relatively low employment intensity and require higher educational levels.

11. There is, however, no negative connotation in the definition of traditional versus modern services, with some traditional services being key for countries such as Lao PDR. Specializing in traditional services does not imply lagging in dynamism or efficiency. Specializing in tourism can be an important development strategy for a country, and transport services are very important to overcome connectivity challenges related to landlockedness. Lao PDR's exports are concentrated heavily in traditional services activities and are average for other countries at a similar level of economic development: 6% relative to GDP (Figure 9). For a landlocked country, transport services should play a very important role, more than for a country that may have a more central geographic location. However, the share of transport services in total services is quite low in Lao PDR, and the performance is driven largely by travel services. Modern services exports remain among the lowest of its comparators (except for Bhutan) and significantly below other countries of similar development level: 2% relative to GDP.

Figure 9: Traditional and modern services exports vs. GDP per capita, 2011-13



Source: Authors' calculations based on data from WDI

12. The expansion in services exports has taken place primarily in travel but also transport (Figure 10). Travel and transport jointly accounted for 87 percent of services exports in 2013. The share of travel increased from 75.4 percent in 2005 to 78.3 percent in 2013. As a result, the share of transport fell from 20 percent in 2005 to 9.2 percent in 2013. The surge in export growth between 2005 and 2007 was driven by telecommunications, computer and information (ICT) (\$5.8 million to \$17.2 million) and travel (\$139 million to \$189 million).

13. Although tourism (travel) has been expanding, it remains in low-end tourism. Expenditures per tourist are low, and have remained steady over the past years at about \$50 USD per day. This is largely the result of day-tourists from within the region, notably China.⁴ In addition, there exists low supply of high-end tourism options in Lao PDR. This may, in part, be due to regulations in the sector. For example, there are restrictions to the entry of foreign firms in several tourism-related activities such as guest houses. These restrictions limit competition and result in less options available to tourists, likely at higher prices or lower quality.

14. Government policy can play an important role in the development of a country's tourism sector, but also how the sector contributes to the economy at large. Traditional services exports – including tourism – should not be overlooked as important opportunities for countries to diversify and drive growth. Tourism has been used as a tool for economic development throughout the world. Cape Verde is one country example that offers lessons in developing a tourism sector as a key driver of growth and poverty alleviation. In less than two

⁴ According to 2014 Statistical Report on Tourism in Lao PDR, elaborated by the Tourism Development Department of the Ministry of Information, Culture and Tourism, the average expenditure per person per day stood at 49.4 USD in 2014, with the average length of stay being at 4.9 days. However, while Cambodian, Vietnamese, or Chinese tourists spend on average 12-15 USD per day, tourists from outside the region spend 73.3 USD per day. These figures have been stable. For example in 2011, the same agency reports average expenditures per day of 50.5 USD and average length of stay of 4.5 days.

decades, Cape Verde has overcome significant environmental and geographic barriers and transformed its economy, as discussed in Box 3.

Box 3: Supporting growth in the tourism sector in Cape Verde

Cape Verde experienced significant and rapid transformation through its tourism sector. It changed from a little-known, small island country into a mass tourism destination. Tourist arrivals increased from 67,042 in 1999 to 285,141 in 2008, an average annual growth rate of 14 percent. Tourist receipts have grown twice as fast, at a staggering 28 percent per year, resulting in high revenues per tourist, and are equivalent to a 44.5 percent share in GDP (direct, indirect and induced). Largely as a result of its extraordinary growth in tourism, Cape Verde has achieved an average 6.5 percent GDP annual growth rate over the last decade.

Such a complex transition that usually takes time was aided by government policies, including:

- Cape Verde's government provided strong public leadership for tourism and developed a positive investment climate. Attracted by a stable economy, foreign investment in tourism has boomed.
- Cape Verde aggressively pursued tourism investment. The Government acquired land, and investment incentives and a stable economy led to fast tourism growth.
- High-quality airports, good aircraft maintenance facilities, and supportive air policies were crucial to increasing arrivals. The country has an airport classified as Category I by the U.S. government.

The tourism growth occurred quickly, and also led to a challenge for Cape Verde's authorities. The fast growth of tourism resulted in gaps in conservation, infrastructure and linkages to the local population. Currently, the government must address uneven development and high leakage, by deepening the connectedness and inclusiveness of tourism.

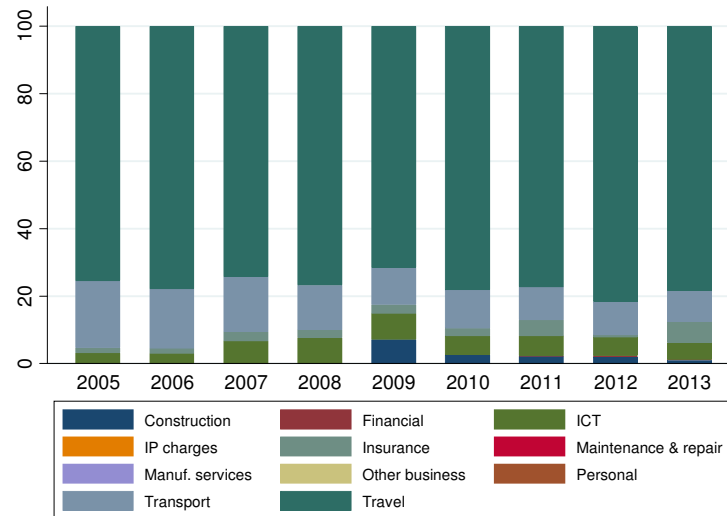
To sustain growth over the long term also requires a professional private sector, high-quality suppliers, and a large number of "destination services." These include utilities, a skilled labor force, food and materials, garbage collection, sanitation, environmental conservation, and transportation. Seeking growth in foreign investment, Cape Verde overlooked the importance of these services, leaving gaps in the sequencing of development. As a result, the sector is not well integrated with the rest of the economy and is not doing as well as it could in terms of poverty alleviation. In addition, to fully benefit from tourism, the labor market must be properly prepared for tourism opportunities.

Source: Christie et al. (2013).

15. ICT services have also become more important for Lao PDR's export basket, increasing their share from 3.2% in 2005 to 4.9% in 2013, in line with the objectives set by Lao PDR's 7th National Five year Socio-Economic Plan (NSEP) 2011-2015. The sector's expansion has been targeted in the 7th NSEP, and faces the challenges associated with setting up an appropriate regulatory framework.⁵ A solid framework would ensure that the liberal stance to trade that Lao PDR has taken in this sector– as revealed by Lao PDR's relatively ambitious commitments to the WTO – results in improved performance.

⁵ These telecommunication services that are being exported include roaming charges and IP transit – or the transit of information that travels through underground cables located in Lao PDR. When this information enters the territory, it's managed by a domestic company, who has rights over those cables and charges for that transit.

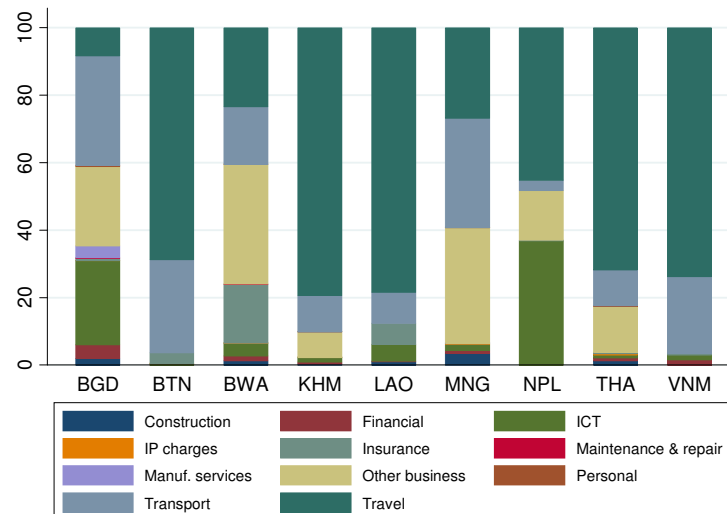
Figure 10: Services export composition over time for Lao PDR, 2005-2013



Source: Authors' calculations based on data from UNCTAD

16. As the export structure demonstrates, Lao PDR outperforms only Bhutan and Vietnam in its modern services export share. With the exception of Bhutan and Vietnam, Lao PDR's services export basket is less diversified towards modern services activities than other peer countries (Figure 11). Lao PDR's services export structure is most similar to that of Cambodia and Vietnam. In Botswana and Bangladesh, for example, modern services represent over 60% of the export basket, compared to 12% in Lao PDR. Thailand, Nepal, Mongolia, Botswana and Bangladesh have all been more successful in exporting other business services. (See Box 4 for a definition of the different services sectors.)

Figure 11: Services exports composition, 2013



Source: Authors' calculations based on data from UNCTAD

Box 4: Sectoral services classifications

Services trade data used in this report are sourced from a variety of sources. Services exports with the world at a disaggregated sectoral level are from UNCTAD. Data are measured according to countries' Balance of Payments statistics, and are identified in the report according to their BOP manual 6 services activity.

Services are classified into following four main categories: Goods-related services, transport, travel and other services. Other services are further disaggregated into: construction, insurance and pension services, financial services, charges for the use of intellectual property n.i.e., telecommunications, computer and information services, other business services, personal, cultural and recreational services, government goods and services n.i.e., and services not allocated.

- **Manufacturing services on physical inputs owned by others:** Cover processing, assembly, labeling, packing, and so forth undertaken by enterprises that do not own the goods concerned.
- **Maintenance and repair services n.i.e.:** Cover maintenance and repair work by residents on goods that are owned by non-residents (and vice versa). Repairs and maintenance on ships, aircraft, and other transport equipment are included.
- **Transport:** Includes all transport services involving the carriage of people and objects from one location to another as well as related supporting and auxiliary services. Also included are postal and courier services.
- **Travel:** Travel credits cover goods and services for own use or to give away acquired from an economy by non-residents during visits to that economy. Travel debits cover goods and services for own use or to give away acquired from other economies by residents during visits to these other economies.
- **Construction:** Covers the creation, renovation, repair, or extension of fixed assets in the form of buildings, land improvements of an engineering nature, and other such engineering constructions as roads, bridges, dams, and so forth. It also includes related installation and assembly work. It includes site preparation and general construction as well as specialized services such as painting, plumbing, and demolition. It also includes management of construction projects.
- **Insurance and pension services:** Include services of providing life insurance and annuities, nonlife insurance, reinsurance, freight insurance, pensions, standardized guarantees, and auxiliary services to insurance, pension schemes, and standardized guarantee schemes.
- **Financial services:** Cover financial intermediary and auxiliary services, except insurance and pension fund services. These services include those usually provided by banks and other financial corporations.
- **Charges for the use of intellectual property n.i.e.:** Include (a) charges for the use of proprietary rights (such as patents, trademarks, copyrights, industrial processes and designs including trade secrets, franchises) and (b) charges for licenses to reproduce or distribute (or both) intellectual property embodied in produced originals or prototypes (such as copyrights on books and manuscripts, computer software, cinematographic works, and sound recordings) and related rights (such as for live performances and television, cable, or satellite broadcast).
- **Telecommunications, computer, and information (ICT) services:** (1) Telecommunications services encompass the broadcast or transmission of sound, images, data, or other information by telephone, telex, telegram, radio and television cable transmission, radio and television satellite, electronic mail, facsimile, and so forth, including business network services, teleconferencing, and support services. They do not include the value of the information transported. Also included are mobile telecommunications services, Internet backbone services, and online access services, including provision of access to the Internet. Excluded are installation services for telephone network equipment (included in construction) and database services (included in information services). (2) Computer services consist of hardware- and software-related services and data-processing services. Exclude noncustomized packaged software (systems and applications), and video and audio recordings, on physical media; computer-training courses not designed for a specific user; and leasing of computers without an operator. (3) Information services include news agency services, such as the provision of news, photographs, and feature articles to the media. Other information provision services include database services, direct non-bulk subscriptions to newspapers and periodicals, other online content provision services, and library and archive services.
- **Other business services:** Cover research and development, professional and management consulting and technical, trade-related and other business services.
- **Personal, cultural, and recreational services:** Consist of (a) audiovisual and related services and (b) other personal, cultural, and recreational services.

- **Government goods and services n.i.e.:** Cover (a) goods and services supplied by and to enclaves, such as embassies, military bases, and international organizations; (b) goods and services acquired from the host economy by diplomats, consular staff, and military personnel located abroad and their dependents; and (c) services supplied by and to governments and not included in other categories of services.

iii. Revealed comparative advantage and export diversification

17. This growth has allowed Lao PDR to maintain a comparative advantage in travel and insurance services relative to other countries in the world. Revealed comparative advantage (RCA) is one indicator of export performance, identifying the sectors in which a country has a comparative edge. The RCA index computed herein compares the share of services exports in a particular services sector of a country with the global share of exports in that same service sector. A country with an RCA index above one is considered to have a revealed comparative advantage in that sector. The higher the ratio, the more competitive is the country. Exports of travel services have grown on average 20% between 2005 and 2013, and Lao PDR has gained competitiveness in the sector, growing its RCA from 2.9 in 2007 to 3.1 in 2013 (Table 2 and Figure 12).

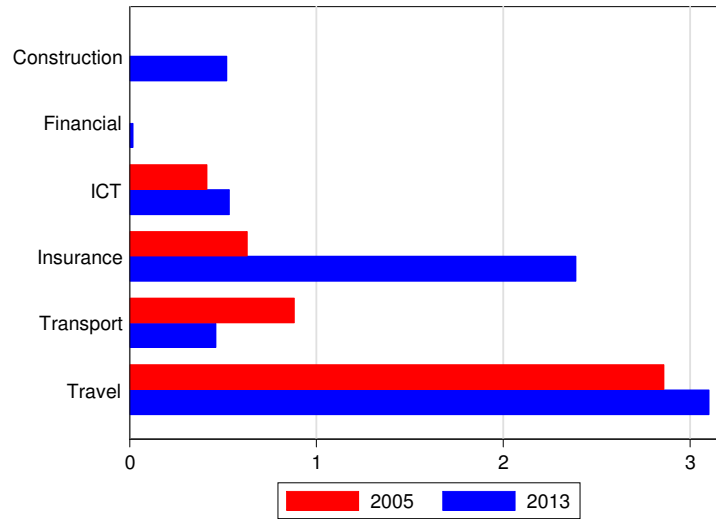
Table 2: Lao PDR's revealed comparative advantages, 2005-2013

Service Category	2005			2013			CAGR 2005-2013
	Value	Share	RCA	Value	Share	RCA	
Total commercial services	184.5			761.0			19.38
Travel	139.2	75.4	2.9	595.9	78.3	3.1	19.94
Transport	36.5	19.8	0.9	70.0	9.2	0.5	8.47
ICT	5.8	3.2	0.4	37.3	4.9	0.5	26.06
Construction				8.6	1.1	0.5	
Financial				1.2	0.2	0.0	
Insurance	2.9	1.6	0.6	48.1	6.3	2.4	41.80

Note: Value in million current USD.

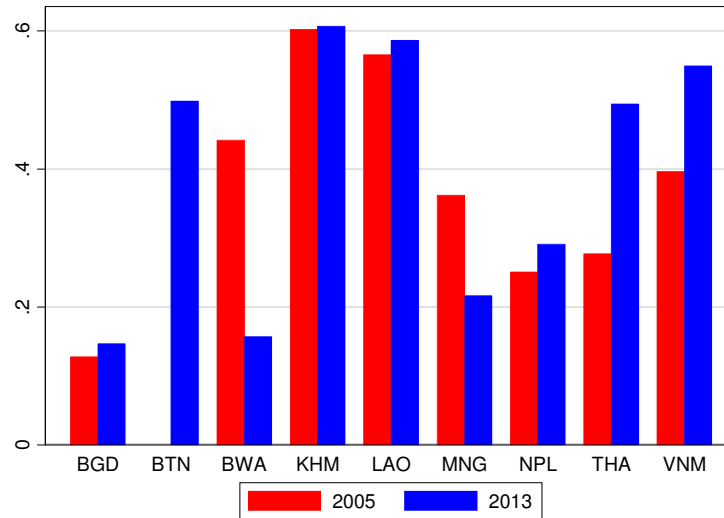
Source: Authors' calculations based on data from UNCTAD

Figure 12: RCA indexes of Lao PDR, 2005 vs. 2013



Source: Authors' calculations based on data from UNCTAD

Figure 13: Export concentration index, 2005 and 2013



Source: Authors' calculations based on data from UNCTAD

18. Lao PDR's export basket is the most concentrated of peer countries, with the exception of Cambodia. Not only is it important to transition towards sophisticated and modern services exports, but export diversification is also important because it prevents economies from being too dependent on one sector, thus reducing vulnerabilities to product or sector specific shocks. Despite the importance of diversifying, however, countries tend to specialize.⁶ To assess diversification, we measure its opposite, concentration, based on a standard measure, namely the

⁶ Cross-country empirical analysis has in fact shown that the process of diversification is related to a country's stage of development. Countries first diversify, in the sense that economic activity is spread more equally across sectors, but later on in the development process they start specializing again (Imbs and Wacziarg, 2003).

Hirschman-Herfindahl index (HHI). The normalized version of the index ranges from zero to one, with higher values indicating higher concentration of exports of services. Lao PDR's export concentration index was 0.59 in 2013 (Figure 13). Cambodia, Vietnam, Thailand and Bhutan also exhibited high levels of export concentration, between 0.5 and 0.6. Botswana, Mongolia and Bangladesh instead have been more successful at diversifying their services export basket. High or increasing concentration is not necessarily a negative outcome, when it is driven by a booming sector. However, it adds to the vulnerability of the economy to sector-specific shocks.

c. Value added exports of services

Measuring exports on a value added basis provides a truer sense of the overall importance of the services sector for export, because it considers that services are used as inputs for other sectors' exports. Even when services exports are measured by their total domestic value added embedded in gross exports, services exports are still primarily composed of transport and distribution services, though business & ICT services become relatively more important once considering forward linkages with the rest of the economy – implying that these services are used as inputs in other sectors' exports. Nevertheless, the findings of this analysis suggest that there are weak forward linkages of services with the rest of the economy except for distribution services, once benchmarked against other countries in the world.

i. Forward versus backward linkages of services in total exports

19. A country's performance in gross services exports undervalues the services sector's real contribution to exports. Exports are traditionally measured in gross terms (i.e. their transaction value, or the price paid for the goods or services). Alternatively, exports can be measured by the domestic value added that they create in an economy, based on economy-wide accounting flows between sectors, found in input-output tables. The analysis of trade in value added nets out imports, and considers that some domestic sectors are used as intermediate inputs to other activities' exports. Measuring exports on a value added basis thus provides a truer sense of the overall importance of a sector for a country's exports. This is because some domestic sectors support other sectors' exports, when they act as inputs to production. This is in particular true for services, which are important inputs to manufacturing and agricultural exports. For example, international evidence suggests that about 30% of manufacturing value added is from services. This means that the sector will contribute more to a country's exported value added than gross export values can account for.

20. When exports are measured by the value added they create in an economy, we can split the contribution of a sector into its direct and indirect contributions. As Box 5 lays out, an analysis of trade in value-added at the level of individual sectors can be undertaken in two ways that yield complementary insights: forward and backward linkages. The direct contribution is the value added a sector generates to produce its own exports directly. If measuring *backward linkages*, the indirect contribution is the value added a sector pulls from intermediate-input sectors to produce its own exports. For example, the exports of the machinery sector would comprise the direct value-added in machinery production, as well as the value-added of intermediate inputs that the domestic plastics industry might have provided to the exported machinery items. Thus, machinery exports “pull” value added from the plastics sector. If measuring *forward linkages*, the indirect contribution is the value added a sector generates by

supplying intermediate inputs to the production of other sectors' exports. For example, exports of food may have been produced using machinery of domestic origin. Thus, machinery "supplies" (part of) the value added in exports of food and beverages.

Box 5: Measuring trade on a value-added basis

The analysis on services' contribution to Lao PDR's exports on a value-added basis relies on the World Bank's Export of Value Added Database. The database contains information on gross exports of services, direct value-added exports of services, and indirect value-added exports of services. The database was developed using social accounting matrices (SAM) from the 9th round of the Global Trade Analysis Project (GTAP), which reflects data up until 2011. The input-output table underpinning the SAM for Lao PDR in GTAP is from 2002, though the model is re-calibrated every round and the parameters re-defined as to reflect the updated dataset.

Exports (of both goods and services) can be measured as:

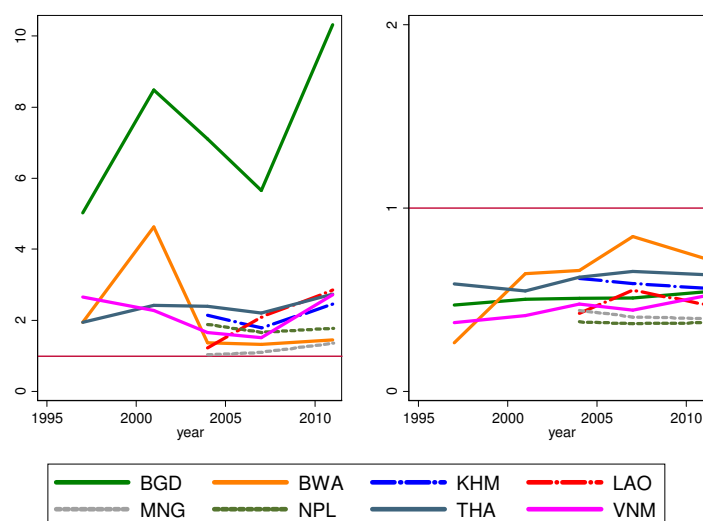
- **Gross exports:** The transaction value of a sector's exports, i.e. what is published as exports in the balance of payments. Gross exports capture both the value added embodied in the production of the export, as well as all (domestic and imported) intermediate inputs. Gross measures of trade statistics are registered in the balance of payments at the transaction value, that is, the price for the goods or services. For example, a business process outsourcing (BPO) company from India sells its services in Europe and India's gross exports of BPO services capture the invoice price of those services.
- **Direct value added of exports:** A sector's domestic value added embodied in its own exports, measured as gross exports less domestic and foreign inputs. This measure captures the value added contribution of a sector in the sector's own exports (or the sector-specific value added of exports). For example, the Indian BPO firm above uses telecommunications services, both from local providers and from foreign owners of satellites, which are intermediate inputs. The direct value added of a sector's exports deducts the value of these inputs from the gross exports amount.
- **Total value added of exports:** This is a measure of the total value added of a sector's exports from a country-wide perspective. It adds to the direct value added of exports the portion of the value added of the inputs that are produced domestically. This measure captures the indirect contribution of sectors to another sector's exports, expressed in terms of forward or backward linkages. It can be calculated as the difference between gross exports and foreign inputs only (backward linkages), or it can be calculated as the sector's direct value added of exports plus the value of the sector used as domestic inputs (forward linkages). This is increasingly important in an environment where global production is fragmented across production sharing networks.
- **Forward linkages:** The value added of a sector that is exported indirectly through exports of other sectors that contain inputs from the sector. For example, the BPO firm may be providing services to a domestic manufacturing firm which exports its products. The share of the BPO firm's input to the manufacturing good exports count as a forward linkage. Forward linkage practically treats the particular sector as an upstream activity.
- **Backward linkages:** The value added from other sectors that is embodied in the value of exports of a particular sector. In this case, the particular sector as a downstream activity. To continue with the above example, this measure captures the value added of all domestic inputs to the BPO sector's exports, e.g. domestically produced telecommunications services. In other words, backward linkages show how important BPO services are to export other sector's value added.

Value added services export data continue to capture cross-border trade (Mode 1) and consumption abroad (Mode 2). Services trade that takes place through FDI and temporary movement of people are not covered in these data. However, production from inward/outward FDI and movement of natural persons would show up as GDP and be included in the statistics as domestic production (not exports).

21. When measuring the contribution of services to exports on a value added basis, we are more interested in the forward linkages: services are important *suppliers* of intermediate inputs, more so than they *pull* intermediate inputs from other sectors. Services are embedded as inputs in exports of manufactured and agriculture goods, while the production

of services exports does not necessarily involve significant input from the latter two. In general, when taking into account forward linkages, the ratio of total value added to gross exports is above one for services – revealing that gross exports are undervaluing the contribution of services to export since services are used as inputs into other sectors’ exports – and below one for manufacturing – revealing that gross exports are overvaluing the contribution of manufacturing to exports since manufacturing use inputs from other sectors for their export. This holds true in Lao PDR, as well as the other comparators (Figure 14). When measuring the services linkages with manufacturing, agriculture and mining in the analysis below, however, we are more interested instead in the backward linkages, as to understand how exports of the manufacturing, agriculture, or mining sectors rely on value added from the services sector.

Figure 14: Ratio of total value added exports to gross exports, 1997-2011

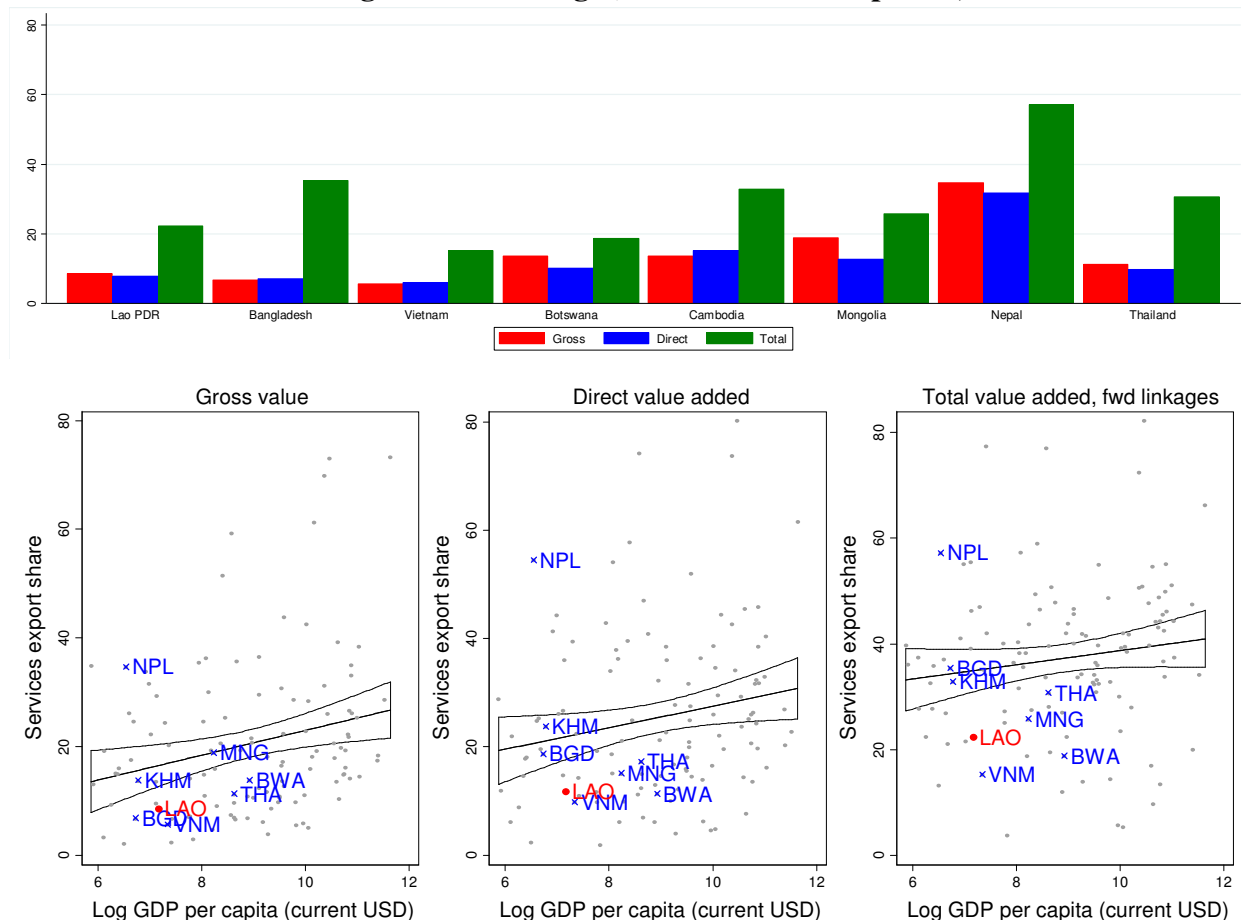


Source: World Bank Export of Value Added Database.

22. In Lao PDR, the share of services in gross exports, as well as the share of services in direct value added exports, is low by international standards. Direct exports of services represent less than 10% of Lao PDR’s total domestic value added that is exported. The importance of direct services exports (direct value added) increases as countries develop (there is a statistically significant and positive correlation between GDP per capita and direct services export shares). Indeed, Lao PDR has one of the lowest direct value added shares among comparators and is significantly below other countries at similar development level.

23. Lao PDR’s relative position by international standards declines once including the value added that services supply to other export activities. When considering the value added that services supply to other sectors’ exports (direct plus the forward linkages), services represent just over 20% of total exported value added. This share is the lowest not only among most peers (with the exception of Bangladesh and Thailand) but also among other countries at similar development level (Figure 15). This suggests that Lao PDR’s forward linkages of services is low (which interestingly exhibits no correlation with level of economic development), given how Lao PDR’s relative position declines in the global scatter once taking into account forward linkages. This result is assessed in more detail in Section III below.

Figure 15: Services' export share (gross value, direct value added and total value added considering forward linkages) vs. level of development, 2011



Source: World Bank Export of Value Added Database.

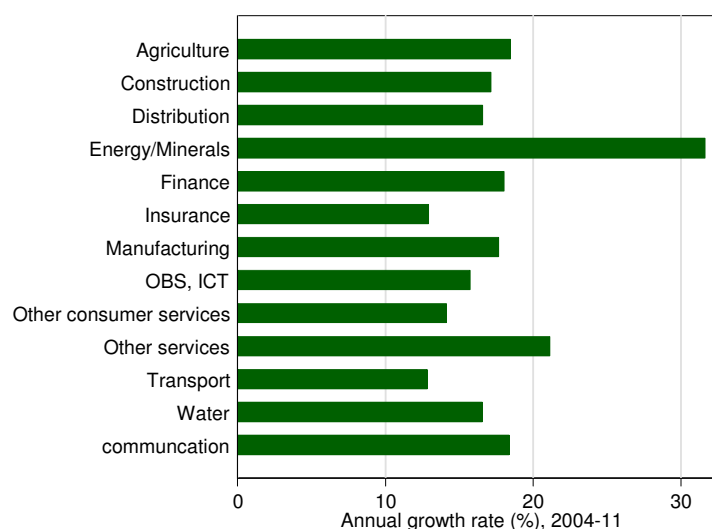
ii. Sectoral composition of services in total exports

24. Different services sectors have been more important for growing domestic value added contained in Lao PDR's exports. The change in value added embedded in Lao PDR's exports between 2004 and 2011 reveals that communications (18%), finance (18%), construction (17%) and distribution (17%) have achieved the highest annual growth rates (Figure 16). The energy/minerals, agriculture and manufacturing sectors have also experienced substantial growth in their exported value added, 32%, 18% and 18% respectively.⁷ The highest growth was in energy/minerals, which highlights the importance of the sector's exports for the Lao PDR economy. This sector is also considered to have immense, untapped export potential. However, as we discuss below, the quality of domestic energy supply is still inadequate, as suggested in the data and supported by the field interviews. This has important implications on the performance of the domestic manufacturing and agriculture sectors. As such, further development of the

⁷ The agriculture sector refers to primary agriculture. The energy/minerals sector refers to minerals n.e.c., coal, gas, oil, petroleum/coal products, gas manufacturing/distribution.

sector should be supported, not just to enforce direct exports of energy/minerals, but for strengthening the linkages with other domestic sectors.

Figure 16: Annual growth rate of value-added in exports by sector (percent), 2004-11



Source: World Bank Export of Value Added Database.

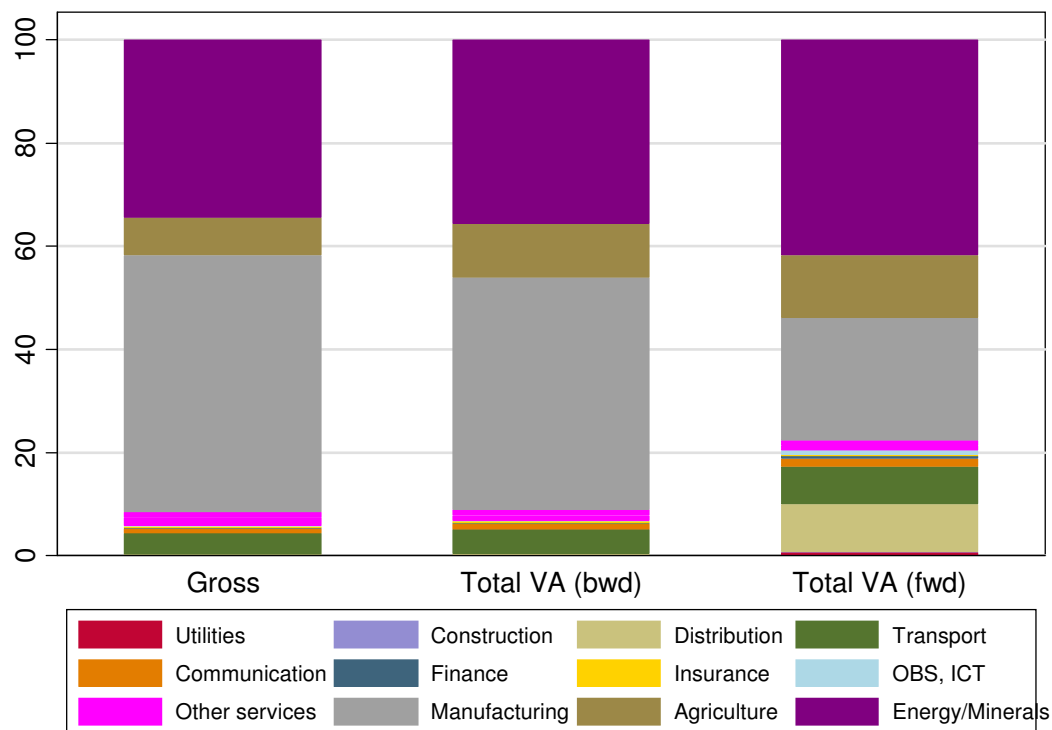
25. Manufacturing exports are the most important for pulling together value added from the economy, but energy and minerals is the most important supplier of domestic value added to Lao PDR's exports. Manufacturing contributed 50% of Lao PDR's gross services exports in 2011, while agriculture contributed 7% and energy extractions and minerals 34%. Once considering backward linkages, energy extractions and minerals carried forward 36% of domestic value added in exports, and once considering forward linkages, the sector supplied 42% of domestic value added in exports (Figure 17). Put another way, 36% of Lao PDR's domestic value added in exports are embedded in energy extractions and minerals exports, either directly or as inputs *from* other sectors. Energy extractions and minerals are also the most important sector supplying value added, when considering the forward linkages. Put another way, energy extractions and minerals supplied 42% of Lao PDR's domestic value added contained in exports, either directly or as inputs *to* other sectors' exports.

26. Services' contribution to exports increases once considering the intermediate inputs they supply to the economy, at the expense of manufacturing. Services exports pull together only 9% of Lao PDR's domestic value added (considering backward linkages), but are responsible for supplying 21% of domestic value added (considering forward linkages). This highlights the role that services play as inputs to other sectors' exports. Distribution services in particular become relatively more important when forward linkages are taken into account.

27. While measuring exports on a value added basis indeed provides a truer sense of the contribution of a sector for export, modern services exports continue to be low even when measured in value added terms. Even when measured by the value added they create in an economy, services exports are still primarily composed of transport and distribution services, though business & ICT services become relatively more important once considering forward

linkages. The finding thus suggests that there are weak forward linkages with the exception of distribution.

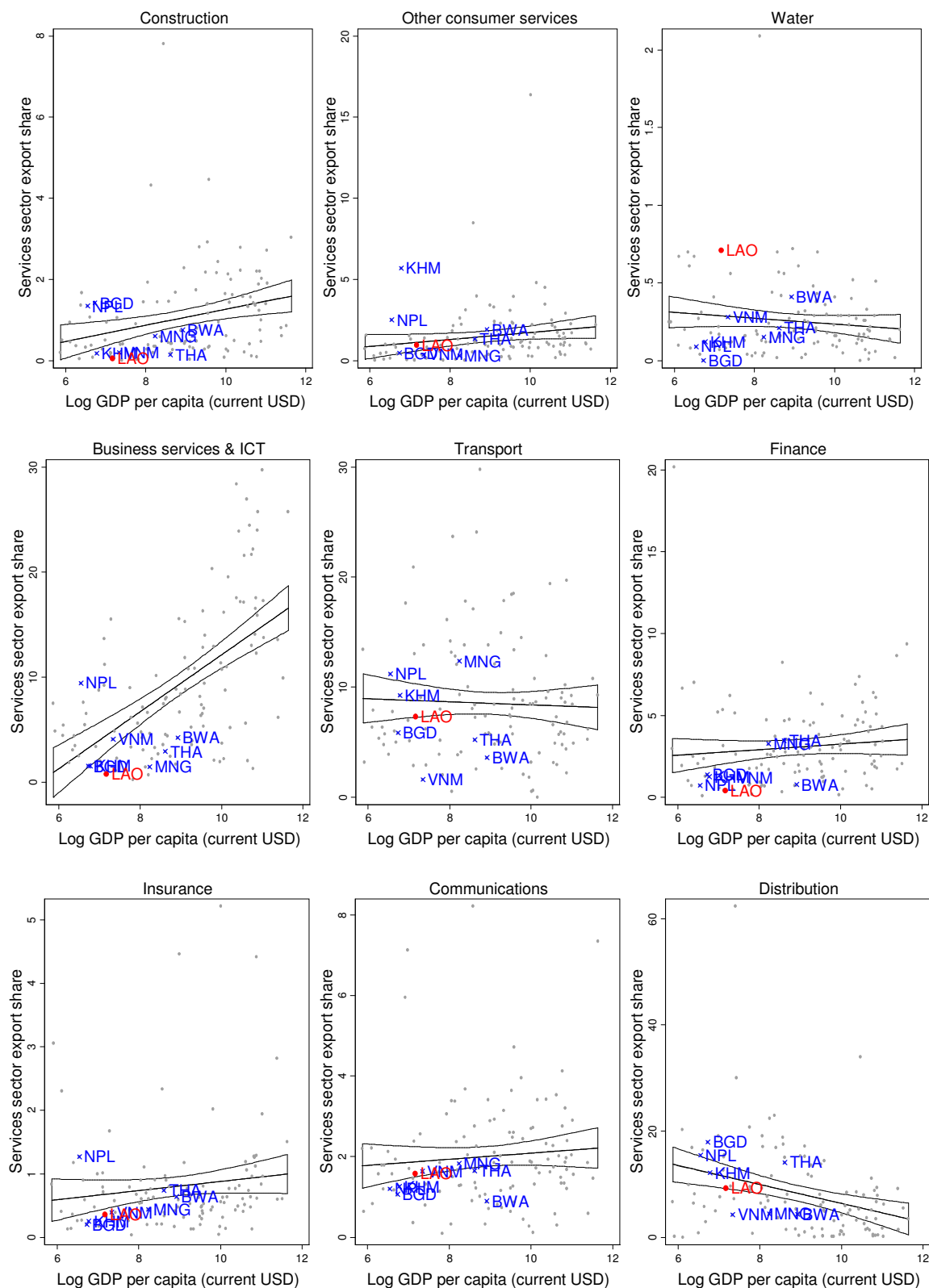
Figure 17: Gross and value-added sectoral export shares by type of linkage, 2011



Source: World Bank Export of Value Added Database

28. Benchmarking the composition of services supplied to the country's exports, Lao PDR lies below or close to expected levels in all services sub-sectors. In addition, Lao PDR's services exports are outperformed by many of its comparators across each sub-sector (Figure 18). This includes communications services – a sector where Lao PDR reveals a comparative advantage in gross values – as well as business services & ICT, finance, and insurance. Instead, water and utility supply are used more intensely as inputs than is expected.

Figure 18: Services sector's export share (total value added considering forward linkages) vs. level of development, 2011



Source: World Bank Export of Value Added Database

29. With the exception of distribution, finance, and water supply, services sectors in Lao PDR are better able to export their own value added directly than provide inputs to other sectors' exports (Table 3). For example, 63% of communication services value added that is exported is done so directly by the communications sector, rather than as inputs in other sectors' exports. This is also true for business services and ICT, communications, construction, insurance, other consumer services and transport services. This again is suggestive that the forward linkages between services with other sectors in the economy are weak.⁸ Section III explores this finding in more detail. Distribution services include: wholesale and retail trade; sales/maintenance/repair of motor vehicles and motorcycles; repair of personal and household goods; and hotels and restaurants. The importance of the distribution sector for value-added exports is thus explained largely by the importance of tourism (hotels and restaurants) for the economy.

Table 3: Top 5 sectors exporting services' value added, 2011

Upstream Sector	Top 5 downstream sectors exporting upstream sector's value added (% of sector's forward linkages)					% in top 5 industries
Business Services & ICT	OBS, ICT 22%	metals 21%	other primary 17%	lumber 9%	energy 6%	76%
Communications	communication 63%	other primary 14%	lumber 6%	energy 4%	metals 4%	91%
Construction	construction 12%	energy 10%	other consumer services 8%	metals 8%	other primary 8%	47%
Distribution	metals 39%	other primary 17%	lumber 10%	energy 10%	chemicals 6%	82%
Finance	other primary 23%	metals 23%	finance 14%	energy 11%	lumber 10%	81%
Insurance	insurance 90%	other primary 3%	metals 3%	lumber 1%	energy 1%	98%
Other consumer services	other consumer services 58%	other primary 7%	energy 6%	lumber 6%	clothing 5%	83%
Transport	transport 60%	metals 23%	other primary 6%	energy 4%	lumber 3%	95%
Water	metals 50%	other primary 15%	energy 11%	chemicals 7%	lumber 6%	89%

Source: World Bank Export of Value Added Database

Note: OBS = other business services

⁸ The weak linkages of business services and ICT with other sectors of the economy is likely, and to some extent related to the lack of available specialized professionals in the economy (for a detailed discussion on links between skills, labor market outcomes and trade, see Ruppert Bulmer and Hollweg (2015)).

II. Assessment of Services Value-Added Linkages

30. Good quality, efficient and productive inputs are important for a firm's or sector's export competitiveness. Because of the value chain linkages between sectors of an economy, the competitiveness of an upstream sector that is used as inputs to production is one important factor for the competitiveness of other downstream sectors. Intermediate inputs from the services sector could include, for example, a manufacturing firm hiring engineers for the design of its exports, the supply of utilities such as water and electricity for crop production in agriculture, or an agricultural producer hiring a trucking service to transport its crops to a market or port for export. Agriculture may also contribute to manufacturing value added, for example, if domestically grown fruit is processed into beverages. And manufacturing may supply inputs to services or agriculture exports, for example, in the form of machinery. If these inputs are supplied by domestic providers (as opposed to being imported), then these show up as domestically-produced value added inputs in manufacturing, agriculture, or service's exports (what we refer to as value-added linkages).

31. Availability and distribution of services inputs – including finance, electricity and water supply – is perceived as an obstacle to manufacturing sectors' performance in Lao PDR. As will be discussed in Section IV of this report, inadequate and unstable provision of electricity and water services, severely constrains the competitiveness of manufacturing firms. Limited access to finance is also an obstacle to firms' performance, which as will be shown below, acts as a tax on firm productivity. All else equal exporters are more likely to perceive the quality of services in Lao PDR as an obstacle to their operations (See Section IV).

32. Section III explores the importance of the services sector for Lao PDR from the second role that services play: as an input into other productive sectors, in particular manufacturing. It addresses the following questions. What are the linkages between the services and the manufacturing and agriculture/mining sectors in Lao PDR and how do they contribute to export competitiveness? Do the manufacturing and agriculture/mining sectors have adequate availability of services imports? And are regulatory constraints in the services sector inhibiting the ability of manufacturing and agriculture/mining activities to use services as inputs?

33. The objective of this analysis is to provide information on this often hidden relevance that the services sector has in the economy. It does so from the forward and backward angles: the services sector's role in 'supporting' other activities through value addition (forward); and how this impacts the manufacturing and agriculture sectors ability to 'pull' contributions from other sectors to transform them into a particular output (backward).

34. There are many examples of how countries have developed services as both a source of export diversification and upgrading, proving important case studies from which Lao PDR can learn. Box 6 provides an example of Uruguay, a country that used services to diversify its export basket away from natural resource intensive products to higher value-added activities. By doing so, it also created the opportunity for services to be used as inputs to the production of its goods exports.

35. Many factors matter in determining the potential of Lao PDR's structural transformation, the quality of services provision being one among them. There are other factors, aside from the one being the focus of this report that matter in determining the potential for diversification and upgrading of the export basket. As it has been argued, key for diversification of export and production structures is the diversification of the country's asset portfolios that include natural resources, in which Lao PDR is rich, but also physical and human capital as well as public institutions (Gill et al, 2014). In terms of human capital, for example, Lao PDR has substantial room for improvement. Education and skills available in the labor market, for example, have been identified as key constraints in the context of Lao PDR. Other factors related to public institutions such as macro instability and a business climate that is not fully conducive to investment and innovation also may play a role Lao PDR's context.

36. In fact, insufficient skills has been identified as the main impediment to private sector growth in Lao PDR. A recent Investment Climate Assessment (World Bank 2014b) suggest that the natural resource boom from which Lao PDR has benefitted over the past years has concealed to some extent the costs of inadequate workforce education and skills, which, they argue, lag behind those of comparators and constrain private sector growth. Low literacy rates, for example, have negative and likely long-term effects on the productivity of Lao PDR workers, as literacy is key for other skills acquisition. This limits the potential for diversification into more sophisticated activities, as exporting firms cannot hire workers with the right skills, discouraging investment in productive technologies.⁹

Box 6: Services exports as a vehicle to diversify into more sophisticated activities
<p>The case of small and remote Uruguay's diversification and upgrading into services is relevant for Lao PDR. Although boasting a higher level of development, Uruguay is a three-million-inhabitant country, abundant in natural resources (fertile land), with an export basket that has been highly concentrated in natural resource intensive products (leather, beef, wool, and more recently soybeans and wheat), since the incorporation of cattle by the Spanish colonizers in the early 1600s. This concentration has spurred the debate about how to diversify the export basket and increase its sophistication.</p> <p>Services, and in modern services in particular such as information and communications technology (ICT) related ones, have been crucial in reducing the country's dependence on natural resource intensive exports. During the last decade, services exports increased more than four-fold, from 745 million USD in 2002 to 3158 million USD in 2013. Within services, ICT related exports increased from 14 million USD in 2002 to 180 billion USD in 2013, accounting now for almost 6 percent of services exports. ICT, jointly with other business services, has become the third most important services sector after travel and transport, with a consolidated comparative advantage.</p> <p>The successful internationalization of modern services firms in Uruguay has been crucial for development. In these activities, remoteness and scale – two important constraints for Uruguayan exporters of merchandise – are less likely to be constraints for scaling up. The sector, made up of about 350 firms producing and selling products and services to 55 markets (Betarte, Cancela, and Moleri, 2008), briefly became the largest software exporting cluster in Latin America, and still ranks first in terms of per capita exports. More importantly, it is the first time in Uruguay's history that knowledge accumulation at the national level has generated significant exports that are not based on natural resources. Further, the dynamic sector has contributed its know-how for the sophistication of natural resource intensive exports.</p>

⁹ See Pillar 3 of the Lao PDR Trade and Competitiveness Analytical Program FY 14-16 (Ruppert Bulmer, E. and Hollweg, C., 2015) for a discussion on skills, labor outcomes and trade in Lao PDR. In that report, the authors recommend policies to, *inter alia*, increase educational attainment, more support for basic education, curricula reform to meet market demand, and aligning vocational training to private sector demand.

The case of Uruguay provides an example of the importance of services for diversification and upgrading in its dual role as a direct supplier of final goods, but also through the inputs to other sectors. Knowledge-intensive services sectors have provided key inputs for resource intensive export products such as boneless beef. In Uruguay, the software industry played a key role in the implementation of the bovine full traceability system that allows identification of the calves from birth to the meatpacker that allows Uruguayan beef to secure high prices in high-end international markets.

Which policies and market conditions have contributed to the development of the ICT sector in Uruguay?

While there is no rigorous assessment of the different factors behind the dynamism of the ICT sector in Uruguay, there is some consensus on the following contributing factors of success:

1. A successful first mover that quickly scaled up and internationalized and showed potential entrants that the business was profitable (decreasing ‘discovery costs’) (Snoeck and Pittaluga, 2012);
2. While at the beginning of the development of the cluster there was no specific public support or incentives, the sector benefited from the patronage of the public sector;
3. Tax exemption incentives, after the export take-off period, and the setting up of Special Economic Zones where export-oriented firms could operate under beneficial tax conditions, helped form a geographical cluster.
4. The presence of well-qualified professionals in the country was an important factor of success. These professionals combined a high level of technical education with in-depth knowledge of specific sectors, putting them in an excellent position to tune into the growing market for sector-specific software applications and services (Kesidou and Romijn, 2008). This has been followed by coordination between the private and public sector and the skill providers to adapt the teaching curricula to the needs of the sector.
5. Support to internationalization of firms – including the work of the export promotion agency, Uruguay XXI, in co-financing search of information about foreign markets and potential clients, as well as developing global business plans.

a. Inputs into and from agriculture, manufacturing and services sectors

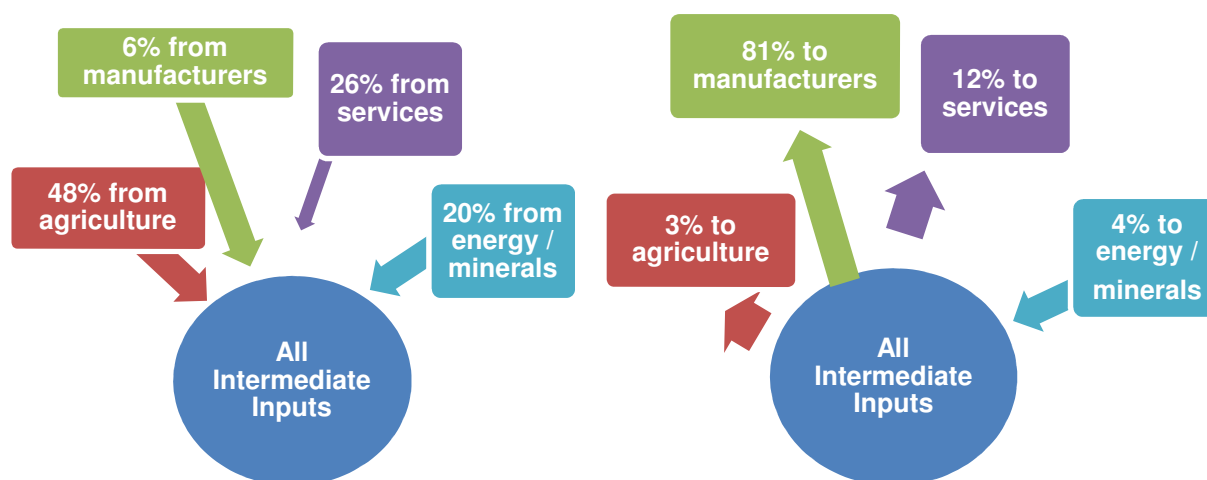
The share of domestically-supplied inputs from the services and manufacturing sectors for domestic production and exports are the lowest in Lao PDR relative to peer countries, and instead domestically-supplied inputs are of agriculture and mining. The vast majority of inputs go to manufacturing production (81%), but of all domestically-supplied inputs that go to export activities, only 45% go to manufacturing exports. The share going to the services sector is the lowest of all peer countries.

37. Lao PDR’s services sector provides relatively little support to productive activities. Services supply about a quarter of all domestic intermediate inputs to economy-wide production when measured in terms of their value added contributions (26%) (Figure 19). This is a low share by international standards. Lao PDR’s production is more reliant on primary activities as inputs than services and manufacturing; more than two thirds of all inputs into productive activities are from the agriculture (48) and energy extractions and minerals (20%) sectors. Manufacturing supplies only 6% of intermediate inputs into Lao PDR’s domestic production.

38. More than three quarters of all domestic intermediate inputs are supplied to manufacturing. Looking conversely at where domestic inputs are supplied to, over 80% of all inputs are pulled together by manufacturing activities. In Lao PDR, only 12% of all domestic inputs (from services, manufacturing or primary production) are pulled together by Lao PDR’s domestic services sector. Agriculture accounts for only 3% and energy extractions and minerals

only 4% of domestic input demand. The fact that few inputs go towards agriculture but that agriculture supplies most of Lao PDR's inputs is suggestive of the upstream nature of the sector.

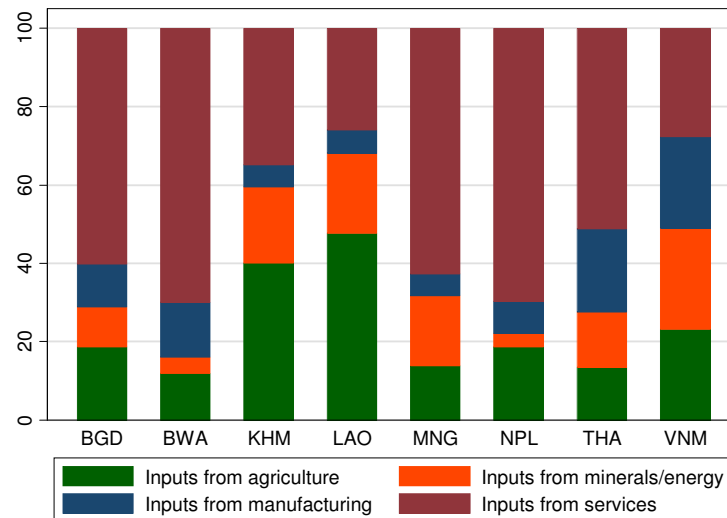
Figure 19: Inputs from (left) and into (right) domestic production in Lao PDR, 2011



Source: Authors' calculations using the World Bank Export of Value Added Database.

39. This structure of value-added linkages in Lao PDR differs from most comparator countries (Figure 20). Services linkages with domestic productive activities is lower in Lao PDR than all comparator countries (26% of economy-wide intermediate inputs are of services). Services' share of inputs is highest in Botswana and Nepal (70%), Mongolia (63%), Bangladesh (70%), and Thailand (51%). Instead, other countries rely substantially less on agriculture and minerals and energy as inputs for exports. In Lao PDR, intermediate inputs supplied by the agriculture and minerals and energy sectors are higher than all comparator countries (48% and 20% respectively). In Vietnam, Thailand, Botswana, and Bangladesh – countries with strong textiles and apparel sectors – manufacturing plays a much larger role in providing inputs to the economies' domestic production. In Vietnam, for example, 23% of domestically produced inputs are from the manufacturing sector, compared to 6% in Lao PDR.

Figure 20: Inputs from productive sectors in peer countries, 2011

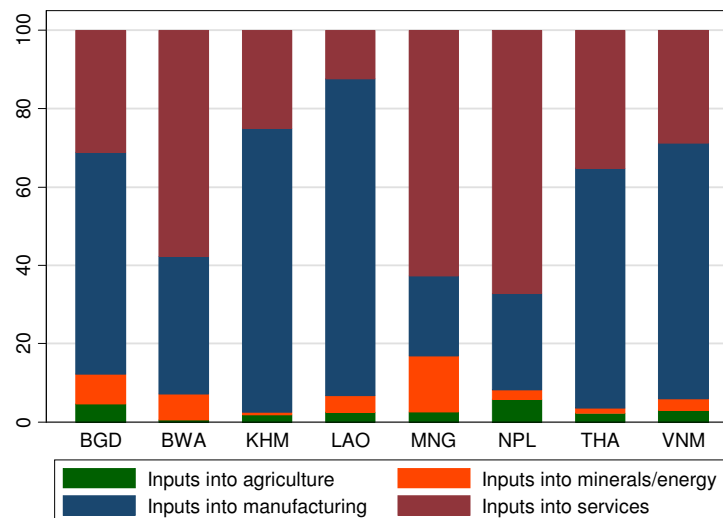


Source: Authors' calculations using the World Bank Export of Value Added Database.

40. Lao PDR's services, agriculture and minerals and energy extraction sectors use relatively few domestically-supplied intermediate inputs, meaning growth of these sectors in its current activities will have less of a pull on the domestic economy unless these domestic linkages are strengthened. Agriculture and minerals and energy extraction activities in Lao PDR demand only 3% and 4% of all domestic inputs provided to domestic production (Figure 21). This is similar to peer countries, such as Botswana, Nepal and Vietnam. In addition, the share of inputs pulled together by the services sector in Lao PDR is the lowest of peer countries (12%). For example, in Vietnam, Thailand, and Cambodia – all countries with strong tourism sectors – services absorb about 30% of all intermediate inputs. (In Botswana, Mongolia, and the Philippines, this share is between 60 and 70%.) Manufacturing instead absorbs a higher share of Lao PDR's domestically-produced inputs than peer countries (81%).¹⁰

¹⁰ Backward linkages of manufacturing are also important in Cambodia (72%), Vietnam (65%) and Thailand (61%).

Figure 21: Inputs to productive sectors in peer countries, 2011



Source: Authors' calculations using the World Bank Export of Value Added Database.

41. The structure of value-added linkages with export activities in Lao PDR is strikingly different than that of domestic production. Primary activities and manufacturing exports now absorb equal amounts of domestically-supplied inputs: 10% of all inputs are absorbed by agriculture, 34% by energy extraction and minerals exports, and 45% by manufacturing exports. Services exports instead absorb 9% of domestically-supplied inputs.

42. Understanding whether services provision in an economy is constraining manufacturing or primary activities – and if so, why – is relevant from a policy perspective. The ability for Lao PDR to integrate into the global economy, to achieve export-led growth in non-commodity exports, and to reap the benefits that such growth has on labor markets and poverty, will depend on achieving international competitiveness in non-traditional export sectors of the economy. This includes direct exports of services, as well as manufacturing and agricultural exports. And services are an important factor in the competitiveness of manufacturing and agricultural exports. Exploring the linkages of services with these sectors, and ultimately whether services are constraining productivity, will provide analytical support to the government implementing policies to improving the efficiency of the services sector. The regulatory environment in services is one primary example of policies that can impact the sector's efficiency.

43. There are many potential explanations for low services content of domestic production and exports. For example, one possibility is that the forward services linkages in Lao PDR are of low-value-added activities including wholesale and retail trade, hotels and restaurants, and transport and storage. Another possibility is that Lao PDR's export sectors are not services-intensive sectors, or that Lao PDR's position in these sectors' GVCs is one that does not demand high value-added services. For example, Lao PDR exports agricultural goods that are positioned upstream in supply chains and create significant domestic value added. It may also be that Lao PDR's firms rely on imported services, or that Lao PDR's agrarian economy is distorting the manufacturing and services shares. The remainder of the analysis of Section III,

supported by firm-level interviews with private firms in both the manufacturing and services sectors, shed light on these potential explanations.

b. Structure of domestic value added in total production and exports

A high share of domestic production is pulled together by the manufacturing sector in Lao PDR, once considering the inputs that manufacturing absorbed from other sectors. Yet manufacturing exports in Lao PDR are lower than in comparators in terms of their domestic value addition. This contrast is explained by two sectors – beverages and tobacco and processed foods – which generate important value for the domestic economy, but are not exported.

44. Lao PDR's manufacturing sector relies less on domestic services inputs than in comparator countries, when looking at either total manufacturing production or export-oriented manufacturing. The structure of manufacturing in Lao PDR helps explain the structure of these low linkages with services; Agri-based manufacturing sectors that generate most of the sector's value addition do so by pulling together value added from domestic agriculture and energy extraction/minerals activities. The inputs that services supply to the agriculture and energy extraction/minerals sector is about average for the country of its comparators.

45. We explore these linkages in more detail by focusing in particular on where services inputs are supplied to, and where manufacturing and agriculture/energy extraction/minerals inputs are supplied from. We look not just at the structure of these linkages in total domestic production (value added), but also in the domestic production that is exported. Such an analysis shows first how important each sector is for total domestic production and exports of Lao PDR in terms of the value added they generate, and second how that value added is generated (either directly within the sector, or through linkages with other sectors of the economy).

46. The inputs that the services sector supplies to domestic production —an important condition for competitive industry – are particularly low. The services sector contributed over a quarter of Lao PDR's domestic production in 2011 when considering forward linkages (28%) (Figure 22, left). Other countries were over 40 percent.

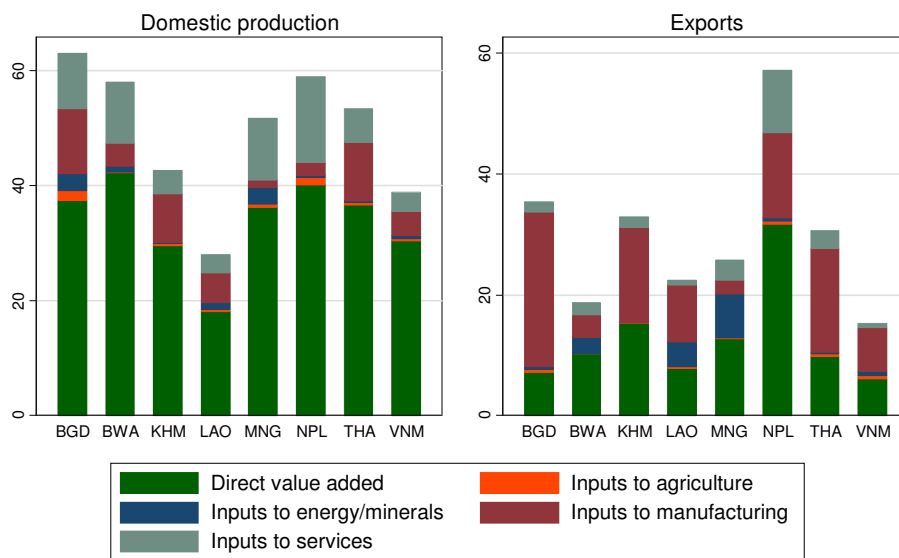
47. In spite of this result, the *structure* of where these inputs are supplied to in the domestic economy at large is similar to peer countries. Looking at the structure of value added that services contribute to Lao PDR's economy, 65% of services' contribution to GDP is generated directly within services sectors. This is close to the average of peer countries (69%). About a fifth of services' contribution to GDP is explained by inputs into manufacturing (18%). This is similar to Bangladesh, Cambodia and Thailand. The share of services into primary activities (mostly energy extractions and minerals) though is slightly above peer countries: 5% in Lao PDR, whereas most peer counties were below 3%.

48. A different picture emerges when looking at the inputs that the services sector supplies to exports. While continuing to generate lower value added, the structure of the linkages of services sector in exports is strikingly different. The services sector supplied just under a quarter of Lao PDR's exported value added in 2011 (22%) (Figure 22, right). Services

exports generated lower value added directly (35% of total services exported value added) than in peer countries such as Nepal (56%) and Cambodia (46%). Looking specifically at the value added that services export, 42% of services value added is exported through manufacturing (9% of total exported value added in Lao PDR) and 19% through primary production activities (again, mostly energy extractions and minerals). In contrast, the share of total exported value added that comes from services inputs into manufacturing in Bangladesh is 72%, Thailand 56% and Cambodia 48%. The linkages the services generate with each other in Lao PDR (3% of total services exported value added in Lao PDR) is the lowest of all countries.

49. Policies can be used to strengthen the linkages between the services sector and other sectors of the economy that involve provision of information, and more importantly, building up skills. This can include, for example, programs to match buyers with sellers. Providing market information, and reducing information asymmetries, should be considered too. For example, from interviews with manufacturing firms, some appeared unaware of types of services activities that could benefit them, such as accounting advice for bookkeeping, advertising services including printing and designing brochures, or legal advice. If such policies are introduced, they should also be subject to impact evaluation analysis. But in addition to the provision of information, it is also important to improve the human capital available in the country. This requires a combination of improving vocational and tertiary education in the country, in the long run, and, in the meantime, facilitating the entry of foreigners with relevant skills for Lao PDR.

Figure 22: Composition of services value added (forward linkages), 2011



Source: World Bank Export of Value Added Database

50. A high share of domestic value added is created by the manufacturing sector in Lao PDR, once considering the inputs that manufacturing pulls together from other sectors (Figure 23). In fact, 49% of domestic output is of manufacturing, higher than all peer countries. This is no surprise, given that the manufacturing sector in Lao PDR demands 81% of all domestic inputs. It is also no surprise, then, that a low share of manufacturing's value added comes directly from the manufacturing sector (37%). This is only above Bangladesh and Mongolia. In Vietnam, for example, 50% of manufacturing sector's value added is created directly, and 57% in Thailand.

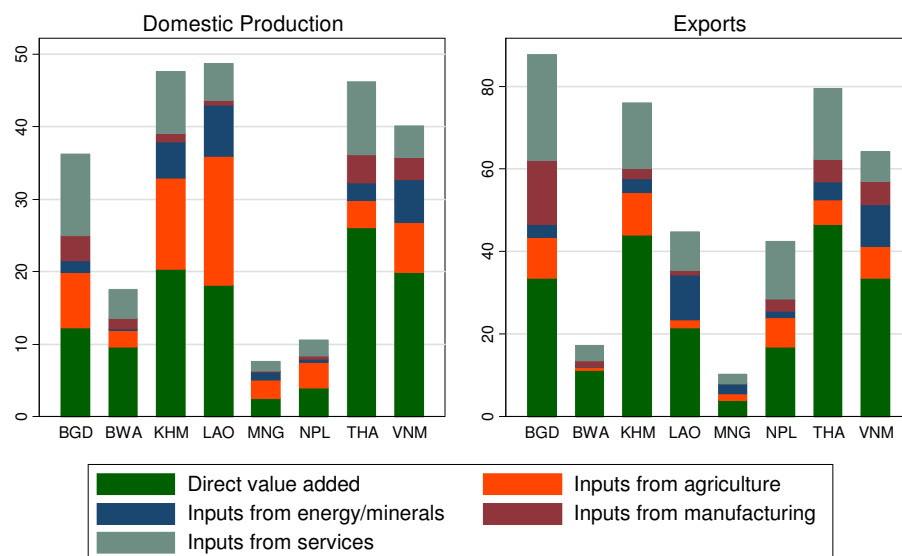
51. However, a low share of total exported value added is from the manufacturing sector in Lao PDR relative to comparators. While 45% of domestic value added in exports is from the manufacturing sector, but this is below other countries like Bangladesh (88%), Cambodia (76%), Thailand (80%) and Vietnam (64%). Almost half of this value added is generated directly within the manufacturing sector (48%).

52. Lao PDR's manufacturing sector relies less on services inputs than in comparator countries, both for domestic production and export-oriented activities. Services inputs represent about 10% of the total value added of manufacturing output. This is much lower than the world average, where services typically represent about one-third of the value of manufacturing. It is also much lower than most peer countries with the exception of Vietnam. For example, in Bangladesh services represented 31% of manufacturing domestic value added, and between 17%-22% in all other countries. Services instead represent about 21% of manufacturing exports, suggesting that services are better used as inputs by export activities in Lao PDR than those focused only on the domestic market, and that to grow manufacturing exports it is important to have a competitive services sector.

53. Instead, manufacturing production in Lao PDR is heavily reliant on inputs from energy extractions and minerals, and to a lesser extent agriculture. In fact, 51% of manufacturing value added generated within the country is composed of inputs from the primary sector. This is higher than all peer countries, though Mongolia was the closest comparator (at 48%). Bangladesh, Cambodia, Nepal, Thailand, and Vietnam all have stronger linkages between their agricultural and manufacturing sectors.

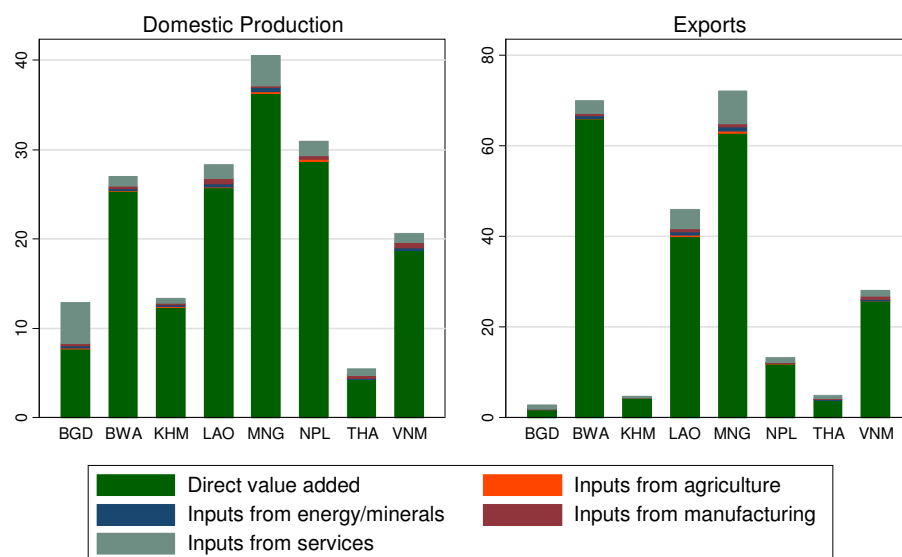
54. Agriculture and energy extraction/minerals activities in Lao PDR are important for domestic and exported value added (Figure 24). Once considering the inputs that agriculture and energy extraction/minerals activities pull together from other domestic sectors, agriculture and energy/minerals are responsible for 28% of domestic production and 46% of exported value added. Similar to peer countries, this value added is created almost entirely within the sector (91% of domestic production and 87% of exports). This helps explain the low inputs that this sector demands from the economy at large. The observation that exports of this sector demand more inputs than in the domestic economy is probably due to the structure of the manufacturing sector, not the structure of primary activities. Put another way, the domestic production of manufacturing relies more on inputs than export activities, i.e. export activities create more direct value addition than what is destined to the domestic economy. The services supplied to agriculture and energy/minerals output is about average of its comparators (5% for domestic production and 9% for exports), though this is higher in Thailand (14%).

Figure 23: Composition of manufacturing value added (backward linkages), 2011



Source: World Bank Export of Value Added Database

Figure 24: Composition of agriculture and energy/minerals value added (backward linkages), 2011



Source: World Bank Export of Value Added Database

55. Select manufacturing sectors have been successful at generating domestic value added in Lao PDR, either directly or indirectly through their input demand (Figure 25). Only a few manufacturing sectors contribute significantly to GDP, including metals, lumber, clothing, food and beverages, and processed foods. This is unlike comparator countries including Thailand and Vietnam, which have a more diversified manufacturing base. Primary

agriculture, metals and other primary sectors, notably electricity generation, all contribute significantly to GDP in Lao PDR.

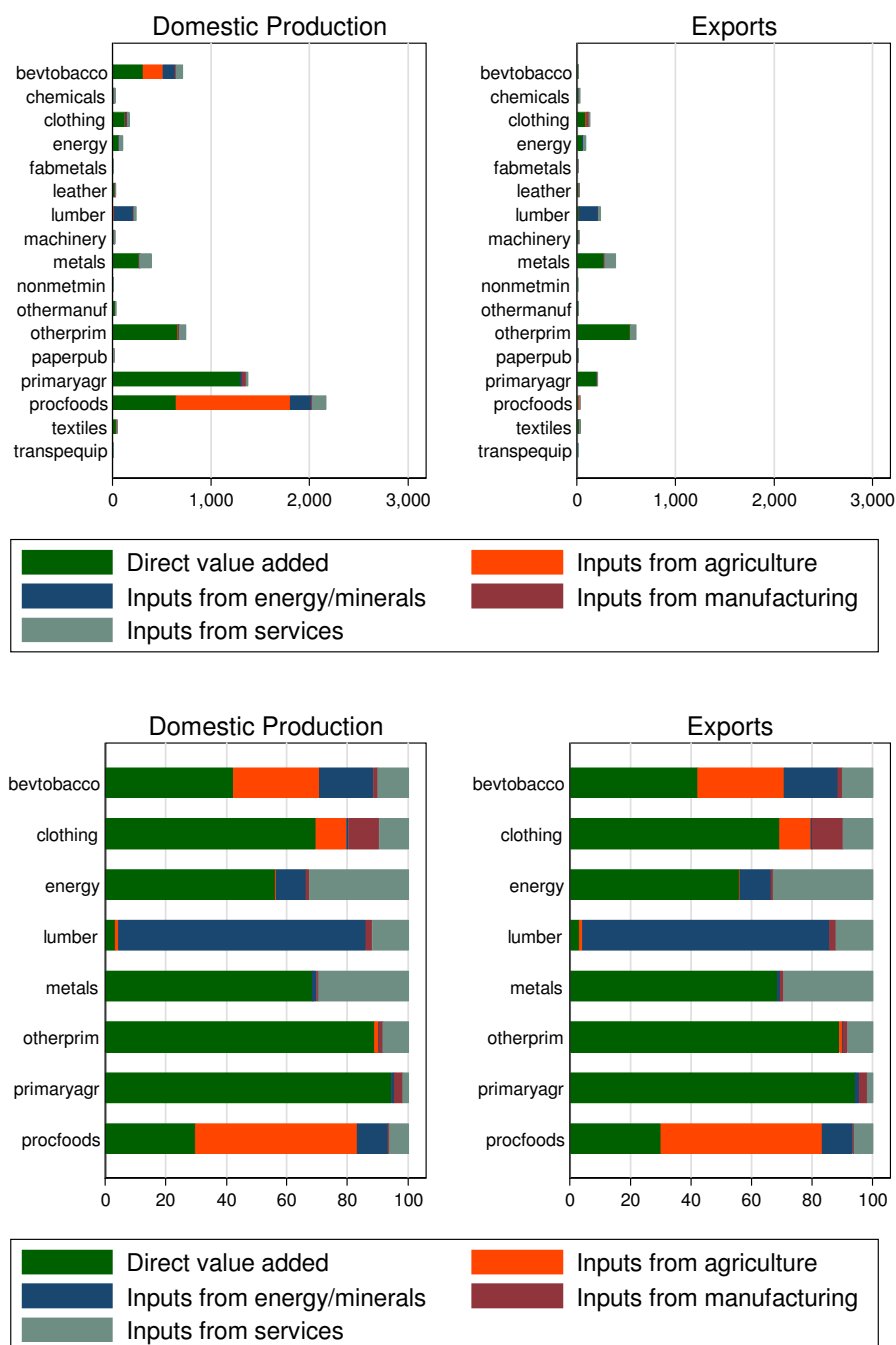
56. Most of the value addition of agri-based manufacturing sectors is done so by pulling together inputs from domestic agriculture activities. This includes beverages and tobacco and processed foods, which rely on domestic inputs of agricultural production. For example, 46% of the value added generated by beverages and tobacco is done so from domestically supplied agriculture. This reliance is even higher in processed foods (64%). Instead, lumber does not rely on domestic agriculture/forestry/fishing, but instead on energy extractions and minerals (which creates 83% of the sector's domestic value addition).

57. The contrasting structure of domestic production and exports in manufacturing value added is explained by beverages and tobacco products, and processed foods. Both of these are very important for domestic production, but are not exported. In addition, agriculture has low export intensity, where a small share of what is produced domestically is exported (at least by formal channels). In contrast, energy extraction and minerals have high export intensity, where a high share of what is produced domestically is exported. Creating export opportunities for these manufacturing sectors would have large benefits for the agriculture sector, as well, given the strong backward linkages. Instead, the output of other sectors, including clothing, energy/minerals, lumber, metals and other primary products, is almost entirely for the export market.

58. The structure of manufacturing in Lao PDR helps explain the structure of these low linkages with services. First, many sectors rely heavily on agriculture and other primary industries as inputs, rather than services. For example, in clothing, beverages and tobacco, other primary agriculture, primary agriculture, and processed foods, services inputs represent less than 10% of the sector's output. Most notably, the percent of services in agriculture is only 2% of total value added generated. Second, Lao PDR's manufacturing sectors have few linkages among themselves, unlike other countries including Thailand and Vietnam. In Lao PDR, inputs from other manufacturing sectors represent only 1% of manufacturing's total contribution to value added, while this number is closer to 10% in Vietnam, Thailand and Bangladesh.

59. Particular activities in Lao PDR do rely heavily on inputs from services sectors. Metals rely little on inputs from primary production, and instead services represent about 30% of the sector's domestic value added brought forward. The energy/minerals sector also relies on inputs from services (32%).

Figure 25: Composition of domestic (left) and exported (right) value added by sub-sectors in levels (top) and shares (bottom), 2011



Source: World Bank Export of Value Added Database.

c. Composition of services value added in manufacturing exports

High quality, efficient and productive services inputs are important for a firm's competitiveness. In Lao PDR, most services inputs to manufacturing production and exports are 'traditional' services. Modern services instead contribute little inputs to manufacturing. Development of financial and communication services in particular is lagging, rendering the inputs to manufacturing low.

60. At the same time, though, evidence suggests that the structure of the services sector in Lao PDR may also be a constraining factor for manufacturing. High quality, efficient and productive services inputs are important for a firm's competitiveness. But as further analysis will show, the availability of services inputs are perceived as major obstacles by manufacturing firms in the country. Not having access to such services may be preventing manufacturing from moving into higher value-added activities.

61. The garment sector is one example where access to productive services are important for value addition. The most basic activity in apparel is cut-make-trim. It is a form of contract work in which a foreign buyer pays fees to the garment factory to carry out the labor intensive task of cutting the fabric, sewing the garments, trimming and packing. All inputs are arranged and paid for by the foreign buyer. This contrasts free-on-board activities, where the garment factories are themselves responsible for the whole process of production including sourcing their own inputs. However, firms need to be in a much stronger financial position to undertake free-on-board activities, and lack of access to finance may inhibit firms from upgrading from cut-make-trim to free-on-board. The next step in upgrading in the apparel industry is original design manufacturing, where garment factories need to perform much more sophisticated services such as R&D, design, advertising and marketing.

Box 7: International experiences of upgrading in apparel

Bangladesh is often cited as an example of a country that has successfully moved from CMT to FOB. Bangladesh has one of the largest apparel export industries in terms of value (\$22.8 billion) and global market share, accounting for 6.4 percent of global apparel exports in 2012 (UNSD, 2014a). The apparel industry is also extremely important to the economy, accounting for 83 percent of total merchandise exports (UNSD, 2014e) and employing 4 million workers in 2012 (BGMEA, 2014). Today, the industry is dominated by locally owned firms, accounting for over 90 percent of firms in Bangladesh (BEPZA, 2013; Yunus and Yamagata, 2014). Many of these firms do FOB activities, but this was not always the case. FDI played a central role in initiating the industry by providing linkages to foreign buyers, technology, and knowledge transfer.

Moving from CMT to FOB for an exporter typically requires the company to (1) have direct access to buyers in foreign countries, and (2) access to finance to purchase the textile inputs. From a country perspective, the firm location also needs to be the headquarters location or a single location of a domestic company. Having direct access to buyers can happen through initial relationships through an agent or by attending things like trade shows. Access to inputs can also be facilitated via EPZs that enable duty-free imports if products are exported, however this limits backward linkages to building a textile industry.

To move from CMT or FOB to ODM, firms will often sell to the domestic or regional market. This was the case for some of the Vinatex firms in Vietnam, for example. However, there have been very few, if any, real examples to date of foreign (meaning Asian, Latin American, or African) firms moving to Original Brand Manufacturing (OBM) for the US and European market.

62. Skills investment is one policy area that can be used to improve the services sector's linkages in an economy. As argued before, skills' scarcity has been identified as a key constraint for private sector growth in Lao PDR (World Bank, 2014b). Both individual and firm level skills are relevant for the competitiveness of the services sector. The quality of labor is another important factor affecting the performance of the services sector, given that many modern services activities rely on a skilled workforce. For example, to upgrade in textiles and garments, firms need to rely on a workforce that can do original design, accounting activities, or marketing. At the level of the firm, "skills" are also important in terms of ability to comply with international standards required to export.¹¹

63. And it's not just the garment sector, either. In fact, anecdotal evidence through firm-level interviews suggest that services are constraining the performance of the energy/minerals sector as well. For example, companies that process heavy metals such as iron into steel need a strong energy supply, as this activity is extremely energy-intensive. Not having a sufficient energy supply will inhibit vertical integration of the sector within the country, and lengthening the domestic value chain of the sector to produce not just iron but stainless steel also.

64. Insufficient access to energy and electricity is also a constraint for manufacturing to diversify and grow in Lao PDR. Lao PDR relies nearly 100 percent of hydropower which has huge potential (in fact Lao PDR is an exporter of electricity). However, some constraints related to the power grid make distribution not fully reliable.¹² Anecdotal evidence gathered from an energy company that in fact there were 10 energy/minerals companies on a waiting list for energy supply (in this respect pricing may play a role – if firms were willing to pay higher prices per kilowatt the constraint may be somehow relaxed). Interactions with energy experts revealed that while the generation capacity exists, there is space to improve the reliability of transmission and distribution grid through further investments.

65. In Lao PDR, most inputs to manufacturing production and exports are 'traditional' services. Comparing the composition of intermediate services that are embedded in manufacturing exports reveals that Lao PDR relies on 'traditional' services activities such as distribution/trade and transport (Figure 26). In fact, on average almost 90% of the services inputs embedded in manufacturing exports are traditional. This finding is the highest among peers, though other economies' manufacturing production and exports relies heavily on wholesale and retail trade as well as transport. This includes Bangladesh, Nepal, and Cambodia.

¹¹ On a related matter, Ruppert Bulmer and Hollweg (2015) report that a garment skills development center was established by Lao PDR Government under the World Bank-led Trade Development Facility to provide skills training to garment factory employees covering technical and management skills. While the cost-sharing program was initially embraced by a sizable number of employers, the authors' report, subsequently demand fell and the center has been unable to transition to financial independence following the subsidy period, even when it diversified its course offerings (page 41).

¹² For example, anecdotal evidence suggested some inconsistencies in distribution along the year, with supply falling short of demand in the dry months.

Box 8: Ethiopian Airlines – A success story

Ethiopian Airlines provides another successful example of a services sector that contributes jointly to export diversification, and an important input into manufacturing and agricultural exports. Similar to the ICT sector in Uruguay (see Box 6), the airlines sector in Ethiopia performs the dual role of services. Pushed the growth of the agricultural sector. The airline sector has driven Ethiopia's strong growth in direct exports of services, and helped link the landlocked country's agricultural sector with the world economy.

Services exports are booming largely due to Ethiopian Airlines. Ethiopia is among the few developing countries where services exports are as important as goods. Between 2005 and 2012, the services-to-goods export ratio hovered around one, implying that services exports were as large as goods exports. Services exports are dominated by transport (63 percent), followed by construction (15 percent), other business (10 percent), travel (5 percent) and insurance (4 percent). The majority of services export is attributed to Ethiopian Airlines, which is Ethiopia's biggest export earner—three times as big as coffee. Ethiopian Airlines commenced operations in 1946, and is one of the fastest growing companies in the airline industry. Today, Ethiopian Airlines serves a network of 82 passenger destinations —19 of them domestic— and 23 freighter ones.

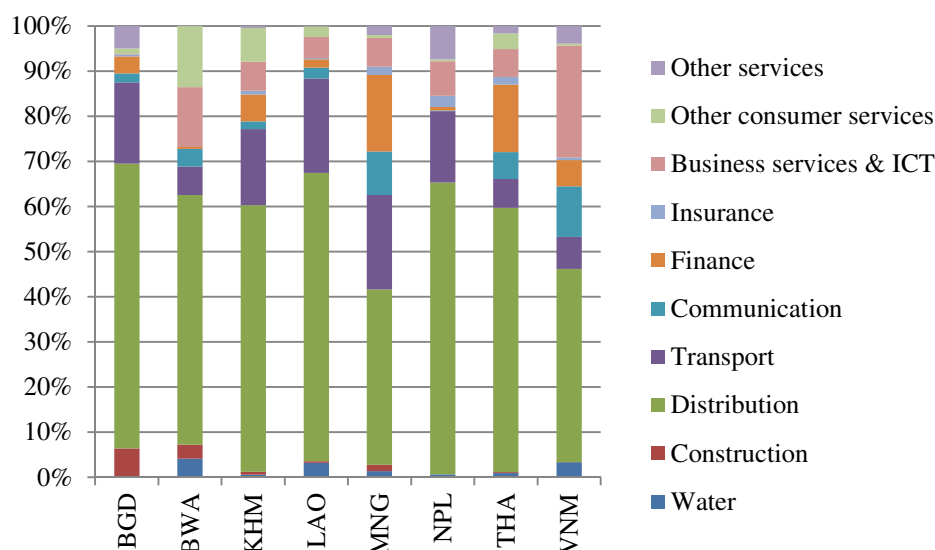
Ethiopia's expansion of horticulture marks a spectacular export success of the past decade that grew alongside Ethiopian Airlines. With the help of Ethiopian Airlines, an entire industry grew from one firm in 2000 to about 100 firms a decade later, contributing exports worth over US\$200 million and supporting the livelihoods of 250,000 people. Ethiopia's flower exports increased 28 times in value between 2004/05 and 2013/14. Indeed, a decisive factor in the exponential growth of the flower industry is the expansion of Ethiopian Airlines' cargo capacity and passenger flights. Flowers are cut and then flown overnight to foreign markets to be available the following day for sale. While over 80 percent of the flowers are destined for the Dutch auctions, there have been recent efforts to seek new markets. With a functioning air cargo system now in place, the experience of the flower industry could be relevant to developing new (diversified) export opportunities, which are in close "proximity" to flowers. New routes opened by Ethiopian Airlines, such as South Korea and Singapore often determine the direction of this search.

Source: World Bank (2014c).

66. Modern services instead contribute little to manufacturing value added. Development of financial and communication services in particular is lagging, rendering the intermediate inputs supplied to manufacturing low. Only 3% of services linkages with manufacturing production are of financial intermediation in Lao PDR, compared to 15% in Thailand, 8% in Vietnam and 5% in Cambodia. In Vietnam, for example, communication services represent about 10% of the services inputs into manufacturing production, compared to 3% in Lao PDR. These shares are significantly lower than all countries including those at a similar development level.

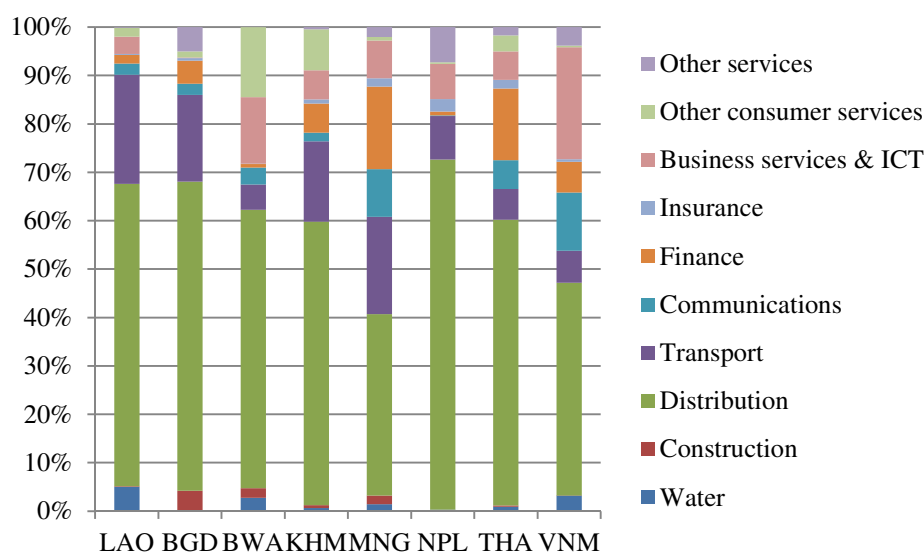
67. In none of the firm-levels interviews did access to finance emerge as lack of supply, as there is sufficient credit available in the domestic market. Rather, firms complaining about lack of finance seems to be more of an issue of creditworthiness of the firm. One consulting company stated that although firms may be in a strong financial position to borrow, they do not have their books in order which prevents them from getting a loan. Such accounting activities are an example of a services that can be supplied by an accounting firm.

Figure 26: Composition of domestic services inputs into manufacturing production by country, 2011



Source: World Bank Export of Value Added Database.

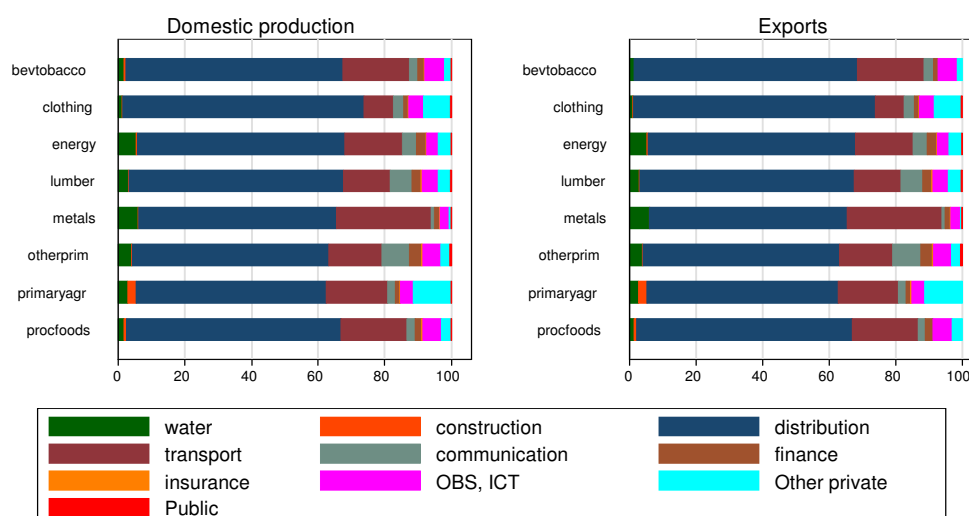
Figure 27: Composition of domestic services inputs into manufacturing exports by country, 2011



Source: World Bank Export of Value Added Database

68. The low use of financial services as inputs for production or export is also consistent across different manufacturing sectors. The structure of services inputs into manufacturing, by type of services sectors, is fairly similar across the important export sectors for Lao PDR (Figure 28); the reliance on traditional services activities continues to hold. Energy/minerals, metals, primary agriculture, and other primary products rely more heavily on services inputs, as well as inputs of the utility sector. Communication services appear to be more important for other primary (energy/minerals) production.

Figure 28: Composition of services value added by sector in Lao PDR, 2011



Source: World Bank Export of Value Added Database.

69. In none of the top sectors are modern services activities important (top five) inputs. Table 4 looks at the top five inputs into exports of manufacturing sectors in Lao PDR. For example, 42% of the value added that is exported by the beverages and tobacco sector is generated directly within the sector, while 29% is from primary agriculture inputs. For metals and lumber, distribution is the second most important input. In the other manufacturing sectors, distribution is the fourth most important input. Transport also enters as one of the top five inputs.

Table 4: Top 5 inputs in Lao PDR manufacturing exports, 2011 (backward linkages)

Downstream sector	Top 5 upstream industries exported in downstream sector's value added (% of sector's backward linkages)					% in top 5 industries
	beverages and tobacco	primary agriculture	other primary	distribution	transport	
Beverages and tobacco	42%	29%	18%	7%	2%	97%
Clothing	69%	10%	9%	7%	1%	97%
Wood products	81%	8%	3%	2%	1%	95%
Metals	68%	18%	8%	2%	1%	97%
Processed foods	53%	30%	10%	4%	1%	99%

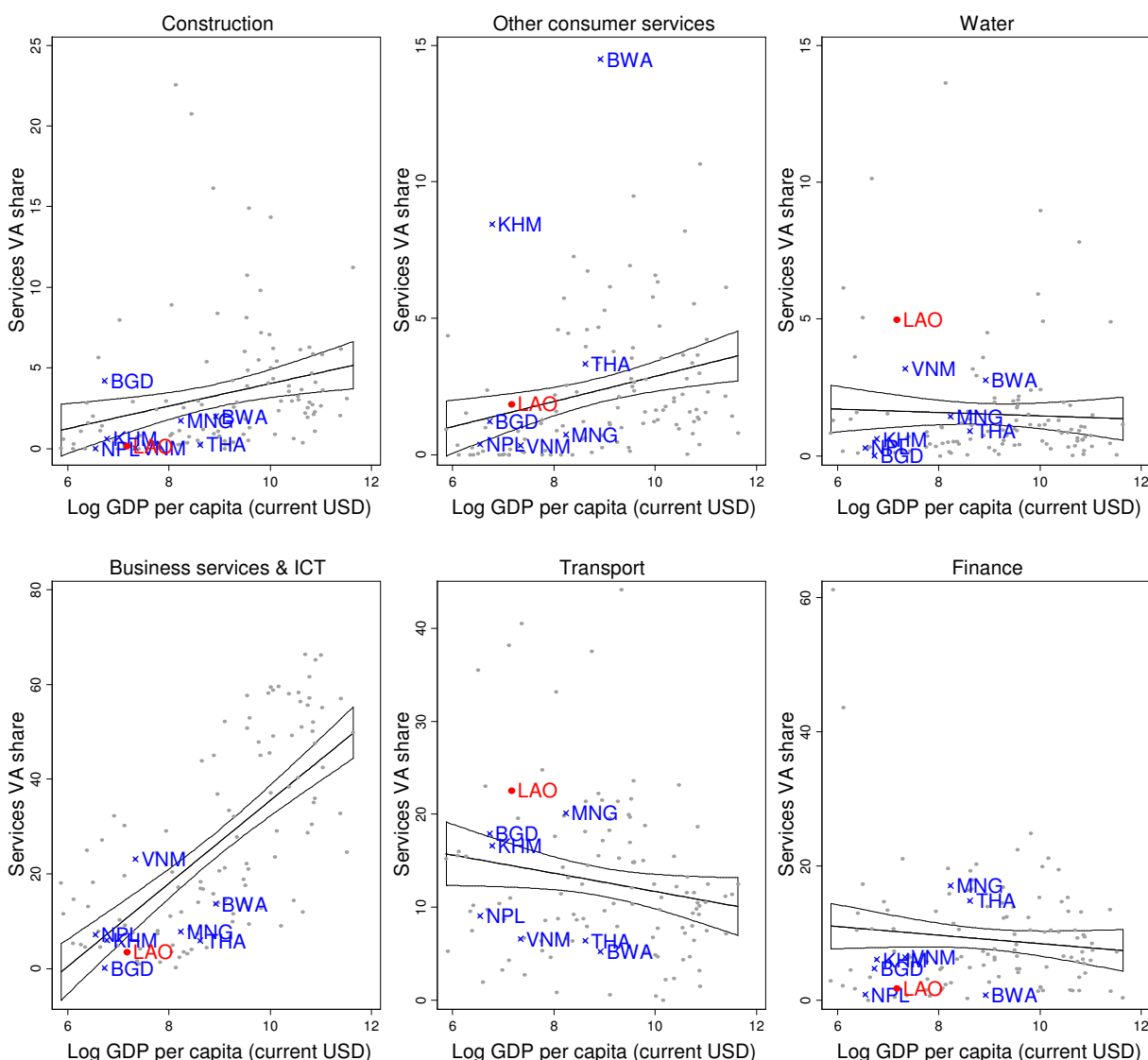
Source: World Bank Export of Value Added Database

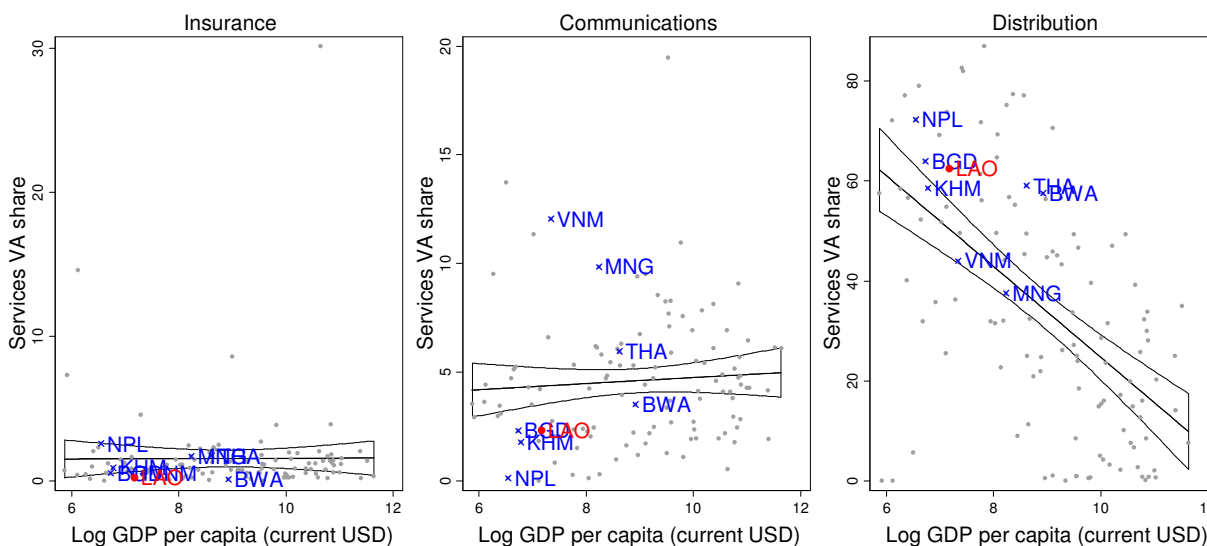
Note: OBS = other business services

70. The support that financial intermediation and communications provides to manufacturing export activities is, by international standards, underdeveloped. The share of domestic financial services in manufacturing exports, as well as post and telecommunication services, is below expected levels when benchmarking against countries of similar development

level (Figure 29). However, there is little correlation with GDP per capita and input use of financial services – meaning that financial services are equally important inputs for export competitiveness in developed and developing countries alike. On the other hand, R&D and other business services and computer activities are strongly correlated with GDP per capita, where Lao PDR slightly underperforms countries of similar development level. The use of water, transport and distribution services is higher in Lao PDR than the average country. The manufacturing sector’s use of transport and distribution services is above expected levels given Lao PDR’s level of economic development.

Figure 29: Benchmarking the composition of indirect services value added embodied in gross manufacturing exports, 2011





Source: World Bank Export of Value Added Database and WDI.

71. This analysis points to specific domestic services sectors that appear to be constraining for manufacturing, and suggests room for policy. For example, lack of finance for manufacturing firms was an issue with bookkeeping and credit worthiness. Matching grant schemes were helping match manufacturing firms with services firms that perform such activities. Other developing countries such as Bangladesh and India have been successful at developing credit rating agencies targeting SMEs.

d. Imports of services inputs

Manufacturing activities in Lao PDR import substantially fewer inputs than in comparator countries. Looking only at the services imported by manufacturing activities, these imports are highly concentrated in construction and transport. Across the most important manufacturing activities, transport services are the most intensively imported services input.

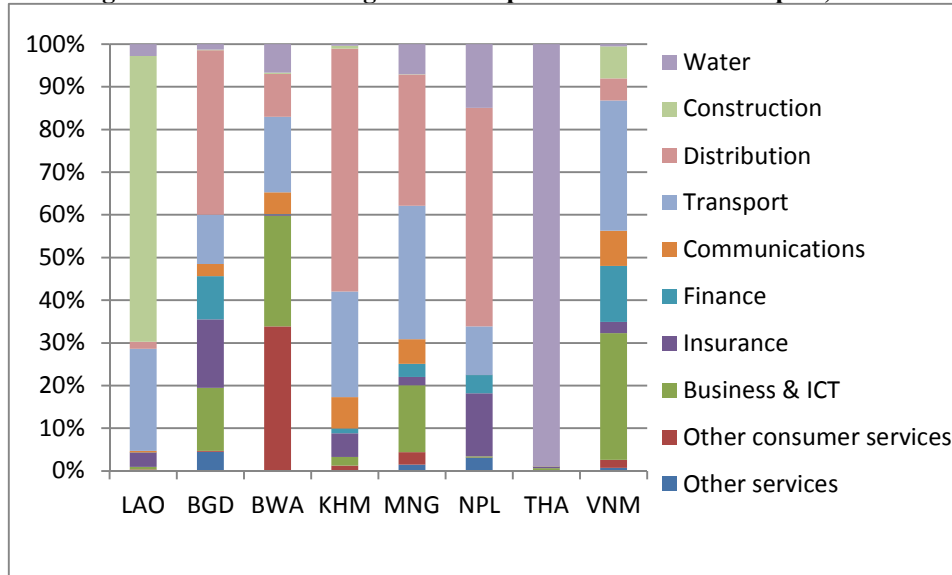
72. Manufacturing activities in Lao DPR import substantially fewer services inputs than in comparator countries, with services imports concentrated in traditional as opposed to modern services. Asking whether Lao PDR's manufacturing sector also has access to imported services as inputs will help uncover whether these weak value-added linkages with modern services activities exist in general, or only with domestically supplied services sectors. The above analysis looks at manufacturing sectors' use of domestically supplied services, which is arguably more relevant when considering the impact of foreign investment restrictions in services on manufacturing productivity for the following analysis in Section IV (given that output produced by foreign direct investment is included in GDP). Nevertheless, we compare manufacturing's domestic versus imported demand of different inputs including services in Box 9. This analysis is done using a different database (GTAP), which uses gross as opposed to net values (and as such is not a direct extension of the analysis presented in Section III).

Box 9: Imports of services by manufacturing activities

Different insights emerge when analyzing manufacturing's domestic versus imported demand of different inputs including services:

- **Manufacturing activities in Lao PDR import substantially fewer inputs than in comparator countries.** Imported inputs represent only 7.5 percent of all inputs used in manufacturing production, compared to an average of 13.8 percent across comparator countries. It reaches as high as 35.8 percent in Vietnam.
- **Looking only at the services imported by manufacturing activities, these imports are highly concentrated in construction and transport.** Lao PDR's import structure contrasts other peer countries (Figure 30). Interestingly, Lao PDR imports almost no financial services, contrasting Bangladesh, Mongolia, Nepal and Vietnam. Imports of communication services are also low, also contrasting other countries such as Bangladesh, Botswana, Cambodia, Mongolia and Vietnam.

Figure 30: Manufacturing sector's imports of intermediate inputs, 2011



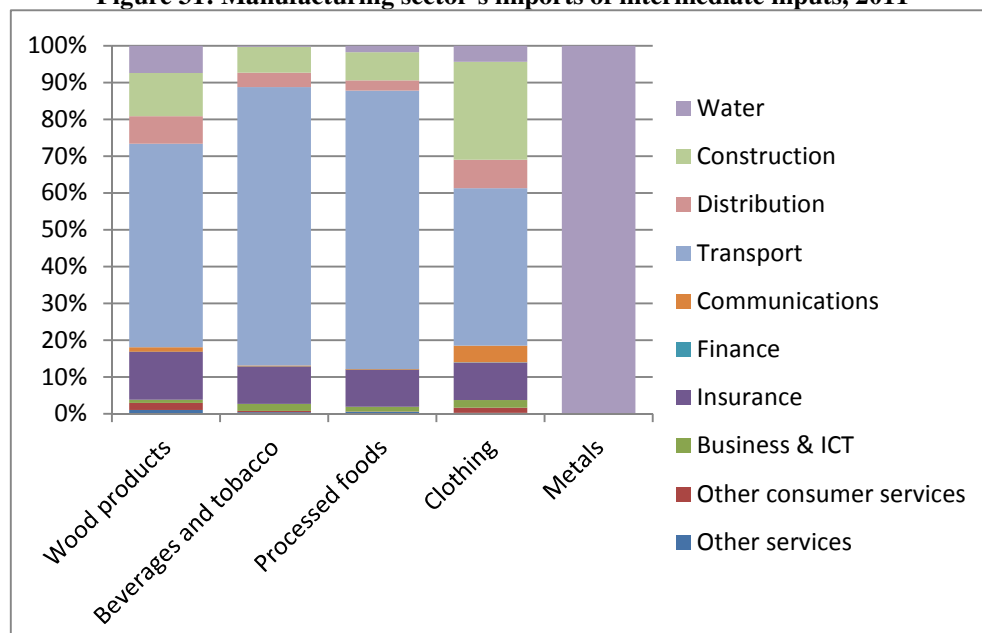
Source: GTAP

- **Across the most important manufacturing activities, transport services are the most important services import** (except metals which only uses water imports), ranging upwards of 90% of imports for processed foods and beverages and tobacco sectors (Figure 31). As discussed in Section III, for example, manufacturing firms rely heavily on Thai transportation companies, especially those involved in cross-border trade. Communications are also important imported services for clothing production.

This analysis is done using gross as opposed to net values from GTAP. As discussed previously, gross trade data capture cross-border trade (Mode 1) and consumption abroad (Mode 2) – what is reported in countries' balance of payments statistics. Services trade that takes place through FDI and temporary movement of people are not covered in these data. For example, the finding that Lao PDR imports no financial services excludes financial services that are provided by foreign banks that have established a local branch in Lao PDR.

As noted previously, distribution services (beyond wholesale and retail trade) include a range of different activities including maintenance and repair of motor vehicles, repair of household goods, and hotels and restaurants. The importance of tourism for the economy helps explain the importance of this sector when measuring exports on a value added database. But it is also therefore no surprise to see low levels of distribution services imported by manufacturing firms in Lao PDR, considering the fact that these statistics do not capture services provided domestically by foreign companies established through direct investment (Mode 3).

Figure 31: Manufacturing sector's imports of intermediate inputs, 2011



Source: GTAP

e. Services Trade Restrictiveness Index

Although Lao PDR does not maintain substantial limitations to foreign services providers, with the exception of distribution and retail services, the level of regulatory restrictions in Lao PDR is higher than expected given the country's level of economic development, and size of the services sector in GDP. High regulatory restrictiveness is associated with a lower gross and direct value added contribution of services to an economy's exports. However, they matter most for the intermediate input supply of services, where fewer services are used as inputs to production by the manufacturing sector in countries with more burdensome regulations.

73. High regulatory restrictiveness creates a reliance on domestic services as inputs for manufacturing production. On average, low levels of services imports are associated with high level of regulatory restrictiveness against foreign services providers. Services are at the very heart of manufacturing global value chains, and many services are becoming sub-contracted globally and nationally (known as the great unbundling), making foreign provision of these services all the more important for manufacturing competitiveness. When particular services aren't available domestically, such as communications or financial services, restricting access to imported services constrains the performance of manufacturing.

74. Relative to peers, Lao PDR does not maintain substantial limitations to foreign services providers, though it is completely closed in distribution / retail services, but

relatively open in professional services. The World Bank Services Trade Restrictions Database shows that Lao PDR exhibits average levels of restrictiveness against foreign services providers.

75. Nevertheless, Lao PDR does maintain restrictions across a range of sectors. Lao PDR has restrictive policies in automobile and life insurance. In Lao, there was a 49 percent limit on foreign ownership, and the licensing regime seemed burdensome as approval from the Ministry of Planning and Investment, Ministry of Finance and Ministry of Industry and Commerce were required. Like most ASEAN countries, Lao PDR has limited foreign investment in fixed and mobile telecommunications services, and allows only a minority foreign share in state entities. In retail, Lao is one of the few ASEAN countries that did not allow FDI in retail. In education and medical services, in mode 4, Lao PDR and the Philippine required medical and educational services to be provided by the nationals.

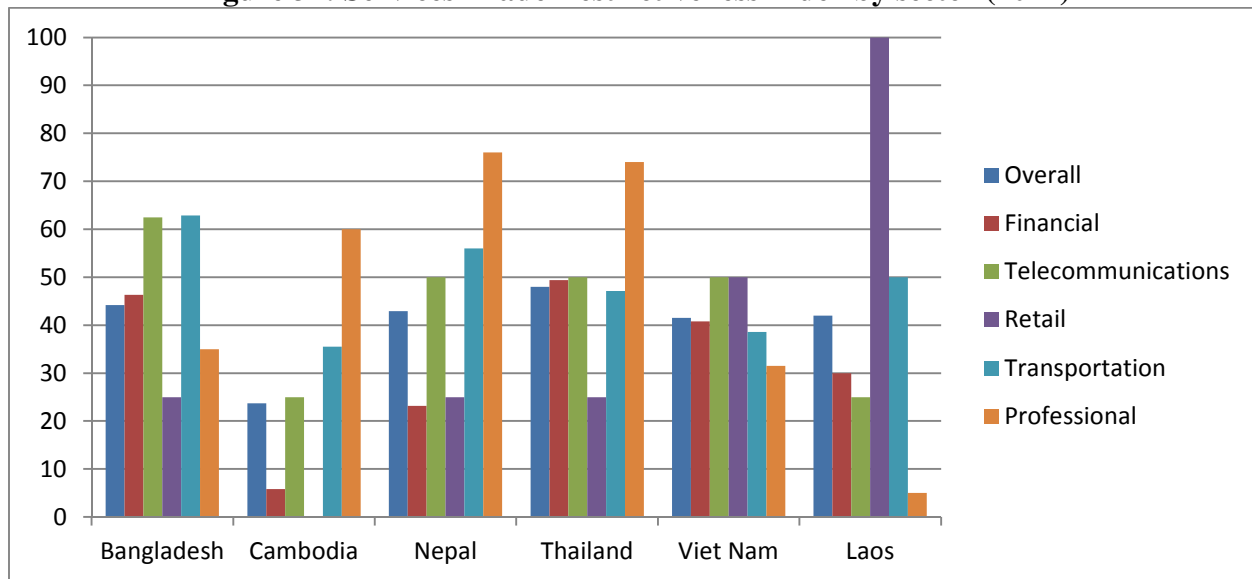
76. The World Bank Services Trade Restrictions Database collects and makes publicly available information on services trade policy assembled in a comparable manner across 103 countries, five sectors (telecommunications, finance, transportation, retail and professional services) and the key modes of service supply. The restrictiveness of the policy measures are scored and quantified into a Services Trade Restrictiveness Index (STRI). A country is considered completely closed if the STRI is 100, and completely open if the STRI is 0. Cambodia maintains the most open regime – with an STRI of about 20 – while Thailand maintains the most restrictive regime – with an STRI of about 50.¹³ However, in Lao PDR, it is not so much the restrictions themselves, but the implementation of the restrictions, as a regulatory assessment that the World Bank has recently undertaken highlights (see Box 10).¹⁴

77. Nevertheless, Lao does maintain restrictions across a range of sectors. Lao PDR has restrictive policies in automobile and life insurance. In Lao, there was a 49 percent limit on foreign ownership, and the licensing regime seemed burdensome as approval from the Ministry of Planning and Investment, Ministry of Finance and Ministry of Industry and Commerce were required. Like most ASEAN countries, Lao PDR has limited foreign investment in fixed and mobile telecommunications services, and allows only a minority foreign share in state entities. In retail, Lao is one of the few ASEAN countries that did not allow FDI in retail. In education and medical services, in mode 4, Lao PDR and the Philippine required medical and educational services to be provided by the nationals.

¹³ There are many nuances that cannot be taken into account when quantifying policy measures into a restrictiveness index, however. For example, restrictions to cross border financial transactions may be justified by a country's level of development or due to macroeconomic policy choices, but would nevertheless increase the STRI score for financial services. The STRI also fails to account for complementary domestic reforms if a country is to reduce restrictions to foreign services providers in a sector. This is the case for the insurance sector in Lao PDR, which has an underdeveloped regulatory authority.

¹⁴ For example, Ward (2014), in a thorough assessment of the regulatory environment around services trade argues that openness to services trade in Lao PDR is relatively low.

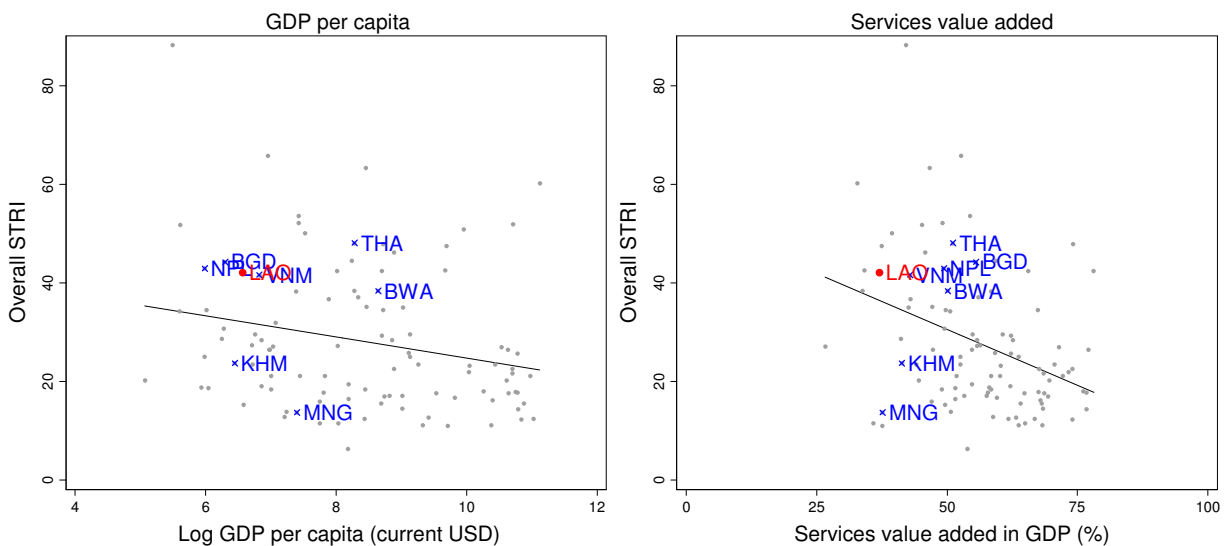
Figure 32: Services Trade Restrictiveness Index by sector (2012)



Source: World Bank Services Trade Restrictions Database.

78. Notwithstanding, the level of regulatory restrictions in Lao PDR is higher than expected given the country's level of economic development, and size of the services sector in GDP (Figure 33). A negative relationship exists with each: more developed countries, who also tend to have larger services sectors in their domestic economies, tend to impose fewer services trade restrictions. With the exception of Cambodia and Mongolia, all comparator countries impose greater regulatory restrictions on foreign services providers than the average country at their level of economic development.

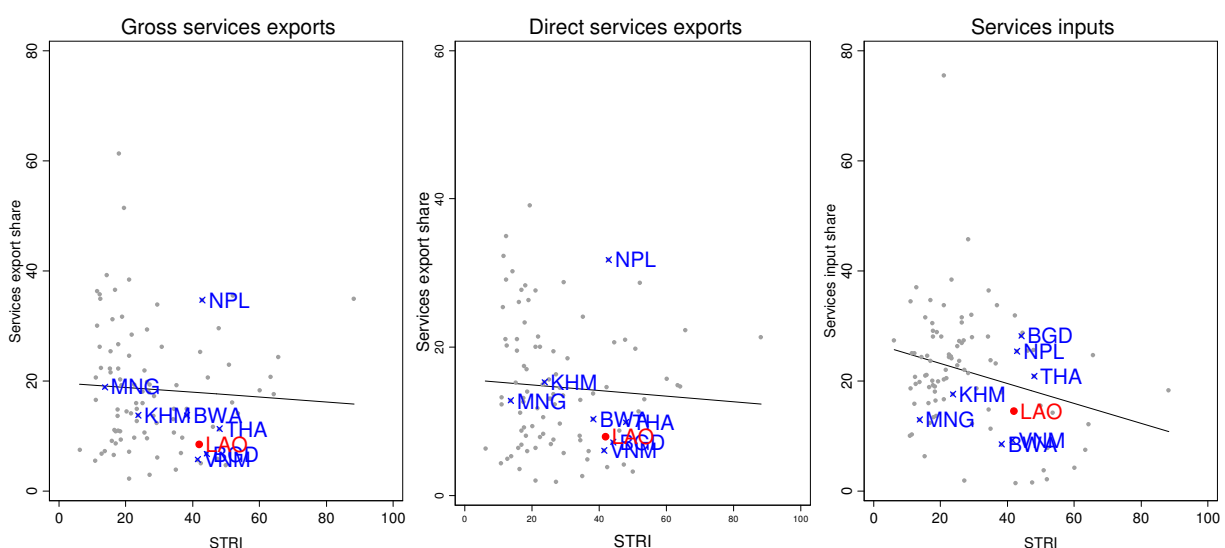
Figure 33: Services Trade Restrictiveness Index vs. GDP per capita (left) and share of services in GDP (right)



Source: World Bank Services Trade Restrictions Database and World Bank World Development Indicators.

79. There is some weak evidence that countries with burdensome regulations towards foreign services providers also tend to export fewer services. High regulatory restrictiveness is associated with a lower gross and direct value added contribution of services to an economy's exports, though the magnitude of the negative correlation is not large (Figure 34). **Burdensome regulations also matter for the services-manufacturing linkages, where fewer services are used as inputs to production by the manufacturing sector in countries with more burdensome regulations.** The regulatory environment towards foreign services providers also matters for the quality of domestically available services inputs. Regulatory restrictiveness reduces the scope for competition in the sector, which in turn reduces the scope for the introduction of cheaper, new, or better quality services inputs. Once considering the use of services as inputs by other sectors, including manufacturing, the relationship with the regulatory environment becomes significantly negative; fewer services are used as inputs to production by manufacturing sectors in countries with burdensome regulations in services. The intensity of services linkages with manufacturing in Lao PDR is low, even when considering the country's level of restrictiveness.

Figure 34: Services Trade Restrictiveness Index vs. GDP per capita (left) and share of services in GDP (right)



Source: World Bank Services Trade Restrictions Database and World Bank World Development Indicators

80. This significant and negative relationship between regulatory restrictiveness and services input use holds in particular for modern services, including communications and other business and ICT services, but also for water and utilities. In fact, regulatory restrictiveness is not correlated with distribution services or transport services.

81. Maintaining a liberal regime for trade and investment is important for competitiveness. Openness in the services sector is part and parcel of a comprehensive growth-enhancing trade policy. The benefits of liberalizing the services and goods markets are mutually reinforcing, the full potential of each not being realized without adequate openness in the other. Yet Lao PDR maintains some restrictions to FDI in crucial services sectors, remaining completely closed in distribution and retail sectors (including restaurants). Furthermore,

restrictions to foreign firm entry into several tourism related activities, such as guest houses, are still in place. In transport, adding flexibility to licensing procedures would help firms – for example in the energy/minerals sector - that may want to opt for integrating the activity under their main core business. Next we explore whether the quality of services provision may be deterring firm’s productivity.

Box 10: Lao PDR’s WTO Liberalization and Regulatory Commitments in Services

Data on the STRI for Lao PDR and peers provide useful insights into the level of regulatory restrictiveness against foreign services providers observed at the time of release of the indicators (2012). However, it is also useful to look into the country’s liberalization commitments in services at the World Trade Organization (WTO) to get a sense of the expected policy stance toward services trade and understand where the most important challenges may lie ahead. This box presents a succinct summary of some of these issues, relying on a recent regulatory assessment of services trade and investment for Lao PDR (Ward, 2014).

Lao PDR became a member of the WTO in 2013. The services sector was an important aspect in the country’s accession negotiations. The types and levels of commitments undertaken are indicative of the areas and sectors in which we can expect to see greater progress toward liberalization, and the more daunting implementation challenges.

Overall, Lao PDR commitments under GATS feature relatively low sectoral coverage and rather shallow obligations. Lao PDR has undertaken commitments on all modes of services supply in 10 sectors, including business services, courier and telecommunication services, construction, distribution, private education, environmental services, insurance, banking and other finances, private hospital services, tourism and air transport. Most of these sectors have received at least a partial commitment. In only two subsectors, Lao PDR committed to full liberalization across modes of supply: value-added telecomm services, including internet and data transmission services; and computer services, including business outsourcing activities like IT consultancy, software implementation and data processing. Real estate and other business services, audiovisual and recreational services, and transport services remain largely uncommitted.

Lao PDR has made substantial use of the flexibility offered by GATS, for example, phase-out commitments over transitional periods of 3,5, and 7 years from WTO accession. Indeed, in half of all committed services, Lao PDR has made use of caps on foreign equity, ranging from 49 to 70 percent. These equity ceilings are subject to transitional periods of 5-7 years, after which foreign majority participation will be allowed.

In telecommunications, Lao PDR undertook both liberalization and regulatory reform commitments. In particular, the country committed to an ambitious 2-year transition period for the establishment of an institutional and regulatory framework in line with the WTO “Telecom Reference Paper” that sets out principles and institutional requirements needed for the regulation of the telecommunications sector, including aspects like rules on access and use of telecomm infrastructure, the set-up of a regulatory body following international good practices, and rules on anti-competitive behavior.¹⁵ A decree to this effect is currently (February 2016) still being discussed in Lao PDR.

Regulatory reforms are crucial enabling factors for a liberal services trade regime to result in improved services provision, and their implementation deserves substantial attention. Indeed, Ward (2014) suggests that investors, both domestic and foreign, operate at a disadvantage due to difficulties in obtaining laws, sub-regulations and instruments which fall below this level; and the inconsistent application of rules by different officials on the same issues.

Strengthening the institutional capacity of the Government of Lao PDR, and its main regulatory agencies is crucial. A sound and transparent regulatory framework will yield little results if the capacity of institutions is not strong. Limited staff and budgets limits the agencies’ capacity to effectively respond to regulatory challenges.

¹⁵ The World Bank Group and other donors are supporting this process through the TDF-2.

However, serious efforts have been made to strengthen the regulatory quality, including the Law on Lawmaking that provides clear guidance on making laws and rules below the level of laws and mandates stakeholder consultations prior to regulatory change (Ward, 2014). The application of the rules and procedures as set forth in this Law is likely to improve transparency and the legitimacy of regulations.

It is also important that regional liberalization commitments are compatible with multilateral ones. Regional integration in services could potentially be a platform for a wider integration with the global marketplace. It is important that multilateral (with GATS/WTO) and regional commitments (with AFAS) are made compatible. While Lao PDR has made greater progress toward liberalization in the regional setting, some inconsistencies (e.g. approval requirements in the regional setting, but not required at the multilateral setting; minimum foreign ownership requirements at the regional setting, but not at the multilateral, etc.) suggest that the negotiating strategies would benefit from further improved coordination unified although they have been centralized under the Ministry of Industry and Commerce.

Source: Authors' elaboration based on Ward (2014), and various sources from WTO and AFAS.

III. Economy-wide effects of services performance

82. How can openness to trade and investment in the services sector improve domestic services performance and hence firms' productivity? And how important is it for firm's productivity upgrading to have access to good quality and reliable services? This section will address these two questions. To approach the first question, we review the existing literature.¹⁶ In addressing the second question, we use firm-level data for a cross-section of countries in East Asia and other regions, as well as with a Lao PDR-specific panel. We begin by examining data on the quality of service provision in Lao PDR and in regional comparators. We explore both data on firms' perceptions and on the actual difficulties faced by firms in procuring these services. We then investigate the extent to which inadequate provision of services affects the *performance* of firms in Lao PDR and in other EAP countries.¹⁷ Our findings largely confirm that inadequate provision of backbone services, particularly weak transportation services and infrastructure, hinder firm performance in Lao PDR (See Table 11).

a. Literature review

83. Services liberalization differs from goods trade liberalization in its effects on domestic activity in the import-competing sector. Indeed, as pointed out by Mattoo et al (2006), for the case of services, liberalization implies increased scale of domestic activity in import competing sectors because foreign factors tend to locate domestically (since for many services, cross-border trade is not feasible and so foreign provision requires the mobility of capital or workers) or domestic competition increases by more effective regulation. These dynamics of competition will lead to better and more reliable provision of existing services, new varieties of services, and competitive pricing in the service sectors. It is also to be expected, increased productivity, trade and output in the service sector, and improved economy-wide performance through links with the productive sectors.

84. A vast literature documents the links between services sector reform and economic performance. The existing work linking service sector reform and performance focuses on

¹⁶ Given data constraints – mainly lack of substantial variation of services trade restrictions, and of actual outcomes in terms of FDI in the services sectors, we could not address the first question empirically.

¹⁷ In this section we will use the terms performance and total factor productivity (TFP) interchangeably. However, it is worth mentioning that the two terms are not equivalent from a technical point of view. The notion of TFP is associated with the efficiency with which firms can combine inputs to obtain output, being thus technical in nature. Improvements in TFP take place when firms manage to produce the same output using less inputs. Thus, measures of TFP should capture this technical dimension by looking at physical relationships between inputs and outputs (in the literature, these measures are often referred as “TFP-Q”. However, due to data unavailability, productivity measures typically rely on relationships between values produced and input bills that are deflated at some sectoral level depending on the granularity of the deflator data (in the literature, these measures are often referred to as “TFP-R”). This implies, for example, that within a given sector, an increase in an input price that is used more intensively by a given firm (and similarly, a reduction in output prices), will make that firm appear as having lost TFP, even if the amount of inputs required to produce a given amount of output remained unchanged. The term ‘performance’ is vaguer than that of TFP, likely highly associated with it, but also more broadly with profitability. Therefore, we will refer to performance as a synonym of ‘TFP’ when measured in value terms. We also use ratios of output values to labor costs (labor productivity) as indicators of performance.

different channels: (i) services reform and economy wide gains, (ii) services reform and services sector performance, (iii) services reform and manufacturing export competitiveness, and (iv) services reform and manufacturing productivity.

i. Services reform and economy-wide gains

85. Mattoo, Rathindran and Subramanian (2006) look at whether the impact of liberalization of services sectors on output growth is different from that of liberalization of trade in goods in a cross-country context for 60 countries during the period 1990-1999. The authors found that countries with open financial and telecom sectors grew faster than other countries. This cross-country evidence confirms the intuitions that emerge from various case studies. For example, Hodge (1998) reports that in South Africa, foreign entrants across all segments of the financial market have played an important part in turning the country into a regional financial center. Foreign entry improved the competitiveness of the financial services market by reducing prices, increasing product variety and improving service delivery.

86. Reforms are not just related to the liberalization of the sector but may also imply improvements in the quality of regulations. In this respect, Eschenbach and Hoekman (2006) used an index of quality of policy for different services sectors in 20 transition economies and found that policy improvements attract FDI, and are associated with the post-1990 growth performance in these economies.

ii. Services reform and services sector performance

87. The sequence of reforms in the services sector matters for services sector performance. Fink, Mattoo and Rathindran (2003) use data for 86 developing countries during the period 1985-1999 and find that privatization and competition improved performance in the services sectors. The authors argue that comprehensive reforms bring the largest gains, and that the sequence of reforms matters. In particular, their results suggest that competition policies should be incorporated simultaneously with privatization, which prevent liberalization to imply the mere substitution of domestic (usually state-controlled) monopolies for foreign monopolies.

iii. Services reform and export competitiveness

88. Telecommunications' infrastructure is key for exporters' competitiveness. Fink, Mattoo and Neagu (2005) and Francois, Manchin and Pelkmans Balaoing (2009) focus on the effects of service sector reform on manufacturers' export competitiveness, in particular looking at reform in the communications-related sectors. The first study uses bilateral data on communication costs and trade flows for 107 countries, finding that costs affect trade flows negatively, with the effect being larger for differentiated goods. The second uses a panel of Asian countries and finds that variations in communications-related infrastructure affected export performance in those countries. More recently, Bas (2013) examines the impact of services reform in energy, telecommunications and transport services in India in the mid-1990s and finds a non-negligible positive effect on the probability of exporting and on export sales shares of

firms producing in downstream manufacturing industries. Here again, evidence from case studies helps us understand the underlying mechanisms in the identified result. In telecoms, Wellenius (2000) for the case of Chile, and APEC (1998a) for the case of Philippines, show that foreign entry and increased competition led to substantial cost reductions and introduction of new services. Also, the expansion of internet services in the early 2000s improved communications within Africa, and between Africa and the rest of the world.

iv. Services reform and manufacturing productivity

89. Not all services sector reforms are equal in terms of their effect on the productivity of firms operating in downstream activities, and not all firms benefit equally. Arnold, Javorcik and Mattoo (2011) use firm-level data for manufacturers in Czech Republic, combined with several indicators of service sector reform, and find sizable effects on productivity. Allowing foreign entry into services industry is found to be the key channel through which services reform affect manufacturing productivity (compared to privatization and level of competition). This is because foreign acquisitions resulted in dramatic changes in the productivity and sales of acquired firms. Focusing on SSA, Arnold, Mattoo and Narciso (2008) used data from 1000 firms in 10 countries during 2001-2005, and found a positive effect of performance of communications, electricity, and financial services on manufacturing TFP. Fernandes and Paunov (2012) used firm-level data of Chilean manufacturers combined with FDI stocks in the services sector, and examined the impact of the latter stocks on manufacturing firms' productivity, finding a positive and significant effect both economically and statistically. They also found that those manufacturing firms furthest from the technology frontier had most to gain in terms of productivity improvements as a result of service sector liberalization.

90. Arnold, Javorcik, Lipscomb and Mattoo (2010) use data from Indian manufacturing firms and construct indicators of service sector reform in the same country, and find that potential productivity gains appear to be greatest for reforming those service sectors most closely related to trade: transport, communications and finance. They find effects on foreign firms to be stronger. Duggan, Rahardja and Varela (2013) look at Indonesian data for the period 1997-2009 and find that reductions in services restrictiveness toward FDI were systematically associated with productivity gains for manufacturing firms operating in downstream sectors. Reforms in transport and electricity gas and water sectors were found particularly relevant for manufacturing performance. Furthermore, foreign equity limits, screening and prior approval requirements and other restrictions related to operations of foreign firms mattered more for downstream productivity, than relaxing restrictions on hiring foreign personnel.

b. Services Sector Performance in Lao PDR: Subjective and Objective Measures

91. The World Bank's Enterprise Surveys provide information on the quality of provision of key services inputs to firms in downstream sectors. Both subjective and objective measures of local services performance are available. The subjective measures are based on firms' perceptions (on a scale of 0 to 4) of how much of a constraint they consider electricity, water services, transportation and access to finance to be for their businesses. The objective indicators are derived from questions about the difficulties and incidents firms confront with their electric and water supplies. Both types of indicators are available for the financial sector and electricity

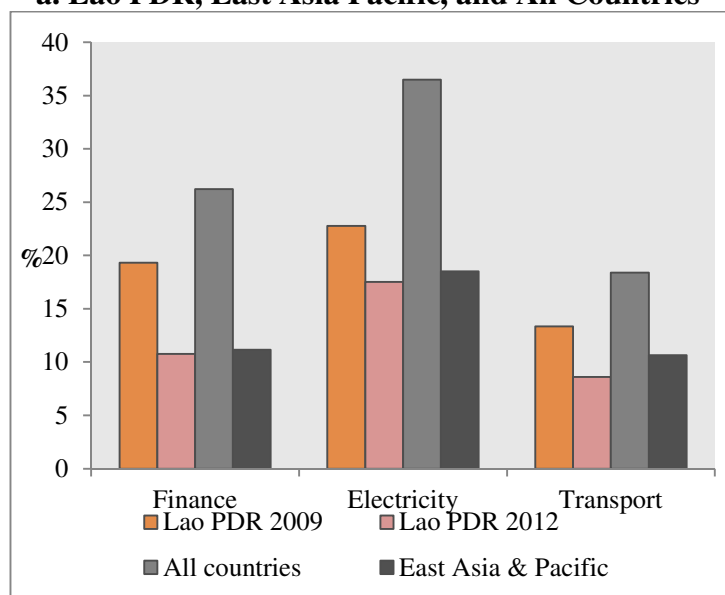
services, while only subjective information is available for transport services. The surveys cover 127 different countries, including Lao PDR. Data for Lao PDR is available for 2009 and 2012.

i. Access to finance

92. Access to finance appears to be a major constraint for Lao PDR firms. Indeed, in 2009, almost 21 percent of firms in Lao PDR identified access to finance as the main obstacle to the success of their operations. When asked to rate the degree of obstacle (from 1 to 4, or none to severe) posed by access to finance, 19 percent of firms said inadequate access was at least a major obstacle. More recent data points to an improvement in firms' levels of satisfaction with access to finance. In 2012, only 10 percent of firms said this was the number one obstacle to their operations, compared to 18 percent for the average firm in EAP and 14.4 percent for the larger cross-regional sample. Along the same lines, in 2012, only 11 percent of Lao PDR firms rated access to finance as a major or severe obstacle, which is on par with the regional average for EAP of 11.2 percent but is substantially below the cross-country average of 26 percent Figure 35a). Moreover, access to finance in Lao PDR appears to compare favorably to other countries, including regional peer Vietnam, where 15.4 percent of firms stressed this as a major or severe obstacle to their performance Figure 35b).

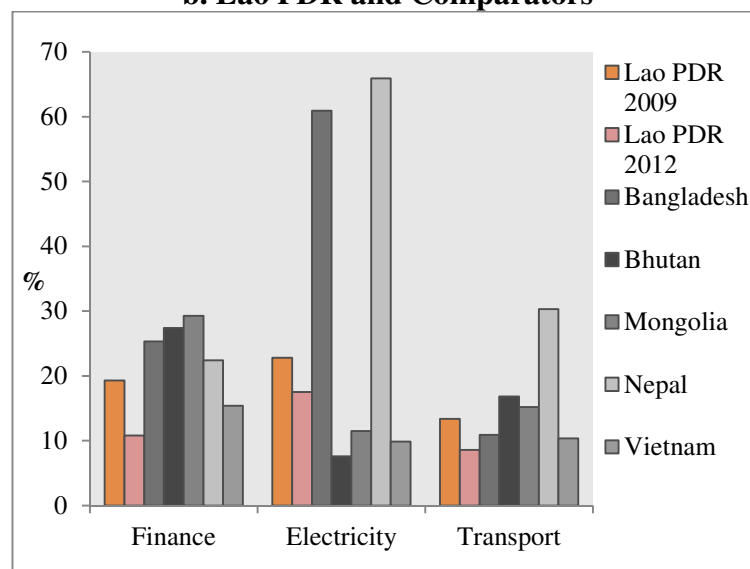
Figure 35. Percentage of firms identifying the provision of each service as a major obstacle

a. Lao PDR, East Asia Pacific, and All Countries



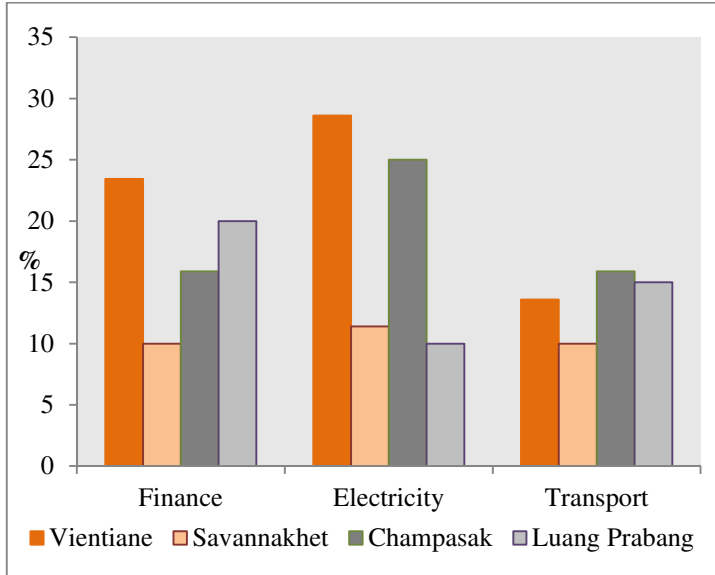
Note: Data for all countries and for EAP reflects averages of responses over one or several years between 2006 and 2014. Source: Enterprise Surveys, World Bank

b. Lao PDR and Comparators



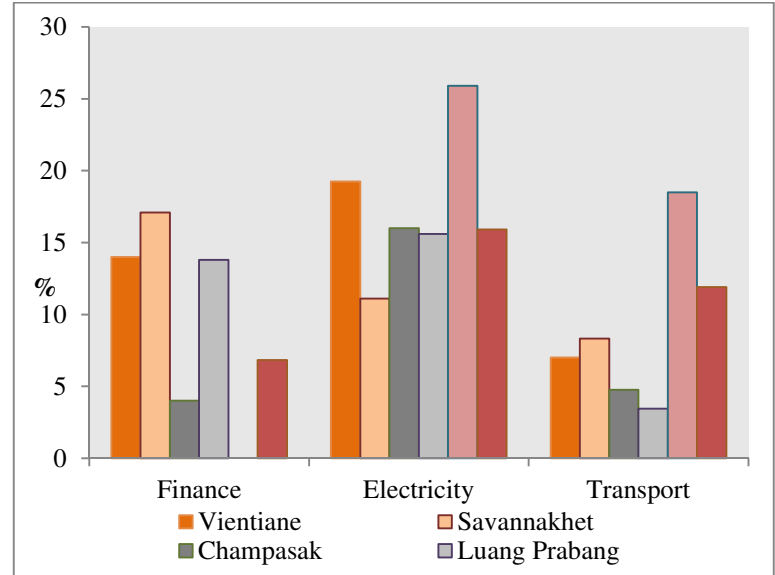
Note: Data for Bangladesh reflects the average of responses in 2007 and 2013. Data for Nepal and Mongolia is an average of responses in 2009 and 2013. Data for Bhutan and Vietnam is for 2009 only. Source: Enterprise Surveys, World Bank

Figure 36. Percentage of firms identifying each service as a major obstacle across regions
a. 2009



Source: Enterprise Surveys, World Bank

b. 2012



Source: Enterprise Surveys, World Bank

93. Perceptions of the quality of financial services also appear to vary across regions. Firms in the capital city, Vientiane, and in Savannakhet, where almost 70 percent of all surveyed firms are located, have the most negative perceptions of the quality of access to finance. On average, 19 percent of firms in the capital identified finance as at least a major constraint. While in 2009, 10 percent of firms in Savannakhet said finance was a major or severe obstacle, this percentage almost doubled in 2012 (Figure 36). By contrast, only 4 percent of firms in Champasak and no firms in Luang Namtha complained about access to finance in 2012 (Figure 36b). These differences in perceptions in the quality of access to finance, however, are not statistically significant.

94. Are these perceptions consistent with the actual quality of services that firms receive? Indeed, Lao PDR firms appear to confront serious actual difficulties when trying to obtain financing from external sources. In a world of perfect financial markets, any investment project that is profitable will be financed irrespective of the availability of internal funds, as credit will be readily available. This helps firms to invest and to innovate, to introduce new products or processes. In Lao PDR, the financial structure of firms reflects a severe bias toward the use of internal funds, not only for financing working capital, but also for investment projects. For example, as Table 5 shows, 84.3 percent of investments are financed internally among firms in Lao PDR, while that percentage is 76.1 percent for the average EAP firm, and 66.9 percent for the average firm in the sample. When focusing on firms in the capital Vientiane, where half of the firms interviewed are located, the proportion of investments financed internally reaches almost 91 percent. For working capital, the relevance of internal funds increases to 87.6 percent in Lao PDR, which continues to be above the regional average of 82.2 percent and the cross-country mean of 71.3. Similarly, only 6.8 percent of investments in Lao PDR were financed by

loans and lines of credit from banks. This is lower than the 10 percent for the average firm in EAP and the almost 17 percent for firms in the larger sample.

Table 5. Revealed objective indicators on access to finance

	Lao PDR*	East Asia & Pacific	All countries
Proportion of investments financed internally (%)	4.3	80.1	66.9
Proportion of investments financed by banks (%)	1.8	10.1	16.8
Proportion of investments financed by supplier credit (%)	1.6	2.04	5.1
Proportion of investments financed by equity or stock sales (%)	1.3	4.8	4.2
Proportion of working capital financed internally (%)	7.6	82.2	71.3
Proportion of working capital financed by banks (%)	1.04	11	13.3
Proportion of working capital financed by supplier credit (%)	1.9	4.01	11.5

Average of firms interviewed in 2009 and 2012. Source: Enterprise Surveys, World Bank

ii. Electricity

95. Poor quality of electricity services is another important obstacle confronted by firms in Lao PDR. In 2009, almost 23 percent of firms identified inadequate electricity provision as a major or a severe obstacle to their operations – mainly issues related to distribution. This proportion decreased to 17 percent for 2012, however. These performance valuations are on par with the average for the East Asia and Pacific (EAP) region of 18.5 percent, but are substantially below the cross-country average of 36.5 percent (Figure 35a). Indeed, as Figure 35b shows, the quality of electricity services in Lao PDR appears to be stronger than in other Asian countries, such as Bangladesh and Nepal. The poor quality of electricity is not only an obstacle to the productivity upgrading of existing industries in Lao PDR. As argued in Section III it is also a constraint for the diversification of the production structure.

96. Perceptions of the quality of electricity services also vary across regions. Electricity services appear to be a greater constraint for firms in the capital city, Vientiane, as well as in Champasak, and in Luang Namtha. More than 28 percent of firms in Vientiane viewed electricity as a major obstacle in 2009, and while this proportion decreased to just above 19 percent in 2012, electricity remained the main obstacle according to perceptions of firms in this city. The proportion of firms that expressed concerns with the quality of electricity was even higher in Luang Namtha (25 percent). In addition, as the comparison between Figure 36a and Figure 36b shows, perceptions of the quality of electricity appear to have improved in some cities (Vientiane and Champasak) and deteriorated in others (Savannakhet and Luang Prabang).

97. Evidence suggests that these rather negative perceptions are based on actual inadequacies in electric power distribution. In fact, as Box 6 shows, there is a strong correlation between the objective and subjective measures in the Enterprise Surveys. For example, firms in Lao PDR wait, on average, 20 days to obtain an electric connection, with a median wait time of 16 days, compared to a median of 10 days for the EAP region and 12 for all countries in the sample (Table 6) – Also, as argued before in this report, there are 10 energy/minerals companies on a waiting list for energy supply– likely consequence of a

mismatch between what firms are willing to pay for electricity and the price at which electricity could actually be supplied, according to anecdotal evidence. On average, firms in Lao PDR experience 2.5 power outages in a typical month. While this average is below the regional average of 6.8 and much lower than the cross-country average of 17.9, when comparing the median values, firms in Lao PDR seem to fare worse than their East Asian counterparts. Indeed, 90% of firms in Lao PDR have experienced a power outage within a month of being surveyed.¹⁸ Moreover, looking within Lao PDR, in smaller cities like Luang Prabang, power outages seem to be more frequent than in larger ones like Vientiane or Savannakhet.

98. Similarly, firms in Lao PDR seem to confront significant problems with the provision of water supply. For example, firms wait twice as much in Lao PDR as in other East Asian countries to obtain a water connection (median of 14 days in 2012 compared to 7 in EAP). Moreover, Lao PDR firms face on average twice as many water outages as firms in other EAP countries. Yet, the average (and median) number of water supply incidents that firms in Lao PDR experience in a typical month is below the average (and median) for the larger sample of all countries.

Table 6. Revealed objective indicators on electricity, telecommunication, and water services

	Number of days to obtain phone connection		Number of power outages*		Number of days to obtain electricity connection		Number of days to obtain water connection		Number of water supply incidents*		Percentage of firms owning a generator
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	
Lao PDR 2009	3.8	3	1.4	0	16	16	73	100	2	0	9.6
Lao PDR 2012			2.65	2	23	15	18.6	14	6.8	1	15.2
EAP	8.9	4	6.8	1	23.6	10	19	7	3.2	0	31.6
All countries	22.1	7	17.9	4	35.2	12	33.7	10	10	3	35.6

*Experienced in a typical month. Source: Enterprise Surveys.

Box 11: Correlation between subjective and objective measures of electricity

What is the relationship between subjective and objective measures of the quality of backbone services provision? The data from the Enterprise Surveys shows a strong correlation between firms' perceptions and objective measures of the quality of electricity services. As Table B1.1 shows, there is a strong positive association between the number of power outages a firm faces per month and the extent to which it ranks electricity as an obstacle to its operations. Each additional power outage that a firm in Lao PDR experiences results in an increase of 0.1 in the obstacle score given to electricity. This effect appears to be substantively larger for Lao PDR firms than for their counterparts in other EAP countries and in the larger cross-regional sample. Indeed, for all countries in the sample, the longer the duration of each power outage, the more negative the assessment of the quality of electricity. Moreover, considering the whole sample, we find a statistically significant association between the number of days firms have to wait to get an electric connection and the extent to which they identify electricity as an obstacle.

¹⁸ Source: Enterprise Survey for Lao PDR 2012.

Table B1.1. Electricity: Subjective and objective measures

VARIABLES	Electricity obstacle	Electricity obstacle	Electricity obstacle	Electricity obstacle
	LAO PDR	LAO PDR	EAP	ALL
Power outages	0.0938*** (0.0233)	0.111*** (0.0378)	0.0398*** (0.0039)	0.004704** (0.001556)
Electric connection		0.00527 (0.00513)	0.0013 (0.0009)	0.00086*** (0.000192)
Length of power outages				0.00955*** (0.001721)
Constant	1.294*** (0.0901)	1.388*** (0.226)	1.33*** (0.051)	
Observations	239	41	575	8,267
R-squared	0.087	0.176	0.095	0.031
Estimation	OLS	OLS	OLS	OLS
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1				

iii. Transportation

99. Being a landlocked country and lacking a railway system, Lao PDR depends primarily on road transport and, to a lesser extent, on river and air transport. Road transport accounts for 80 percent of all passenger and goods movement. While the road network reaches all parts of the country, its density is highest in the central and southern regions of the country (OECD, 2013). As Table 7 shows, however, road density is lower in Lao PDR than in other countries in the region. Moreover, less than 22% of the total road network is paved, with paved stretches serving urban areas.¹⁹

Table 7. Road infrastructure indicators in Lao PDR and comparators

	Total road network (thousands km)	Road density (km of road per thousand km ² of land area)
Cambodia	38.3 (2004)	216.7 (2004)
Lao PDR	29.6 (2009)	171.4 (2009)
Malaysia	39.6 (2009)	300.5 (2004)
Thailand	180.1 (2006)	352.4 (2006)
Vietnam	160.1 (2007)	516.3 (2007)

Source: ADB, *Key Indicators for Asia and Pacific* (2012)

100. Despite significant improvements in transport and connectivity in recent years,²⁰ the quality and availability of transportation services continues to be a problem to a sizable proportion of firms in Lao PDR. Almost 14 percent of firms in Lao PDR identified poor quality of transportation services as a major or severe obstacle, compared to the regional average

¹⁹ 22% is in excellent or good condition, 23% in fair condition, and 55% in poor condition; seasonal closures, particularly of local roads, are frequent due to poor surface, deficient cross drainage, lack of water crossing structures, flooding, and slope slides. Most of the road in Lao PDR built with lower axle load compared to ASEAN standards.

²⁰ See, for example, TTFA, World Bank (2014).

of almost 11 percent. In fact, in 2012, almost 8 percent of firms in Lao PDR said transportation was the number one constraint to their operations. In contrast, only 5 percent of firms in EAP and 2.6 percent of firms in the larger sample of countries ranked transportation as the top obstacle.

101. Yet, according to firm perceptions, transportation services in Lao PDR are less of a problem than in other Asian countries, such as Nepal and Bhutan, where 30 percent and 17 percent of firms (respectively) identified transport as a major or severe obstacle Figure 35b). Firms' valuations, however, vary across regions within Lao PDR. Firms located along the country's main trading routes, which connect Vientiane, Savanakheth and Pakse with Bangkok and Laem Chabang seaports in Thailand, tend to have more favorable assessments of the quality of transportation services. This is not surprising, given the decreasing costs in trucking services since restrictions to the cross-border movement of trucks were lifted in 2004. As a result, larger, better-organized Thai trucking firms provide most of the cross-border transport services.

102. Lao PDR trucking companies, however, still face challenges in the market. These are smaller companies using older equipment, and that serve primarily short-distance domestic movements, and transport goods to and from the border. This requires them to load and unload goods at the border, adding to the total cost of land transportation. Apart from being at a competitive disadvantage relative to Thai firms, other factors discourage Lao PDR operators from providing cross-border services, including the failure of their trucks to meet Thai safety standards, differences in language, which expose drivers to harassment, and the fact that vehicles are driven on different sides of the road.

103. Overall, the costs for transporting cargo within Lao PDR remains high. This is particularly the case when compared with other developing countries, mainly due to the distance to the ports and the large proportion of empty containers moving from the port for loading or returning to the port after unloading (World Bank, 2014).

104. International transport firms need licenses to operate in Lao PDR, which are issued to firms for a period of 5 years. The number of transport firms with licenses to operate between Thailand and Lao PDR increased dramatically, from 3 in 2000 to 111 in 2011. Nevertheless, anecdotal evidence suggests the system of licenses may be posing a constraint to some local firms. When interviewing firm representatives in Lao PDR, they mentioned that some firms were, being unable to obtain licenses, could not set up their own transport systems and had to rely instead on established firms.

105. Restrictions associated with licensing still remain that impede firms to integrate vertically and develop their own transport services. Anecdotal evidence suggest that this affects many energy/minerals exporting companies that, due to the high intensity with which they use transport inputs they prefer to integrate this activity to their core operations (for exports of metals, for example, transport accounts for 8% of total inputs, as reported in Section III, being the third most important input after metals themselves and distribution related inputs).

Table 8. Trade volumes, distances, and cost for major trade corridors

Corridor	Distance (km)	Travel time (hours)	Trade volume (% of total)	Cost (USD per container)
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Vientiane-Bangkok	620	12	40	1,200
Savannakhet-Bangkok	645	12	19	1,100
Pakse-Bangkok	750	13	9	1,300

Source: World Bank (2014)

iv. Telecommunications

106. Evidence suggests that Lao PDR still needs to strengthen its telecommunications performance relative to comparators, despite significant progress in updating and improving telecommunication services in recent years. Table 9 presents data on the ICT Development Index (ICI) for Lao PDR and other ASEAN countries, showing that in 2012, Lao PDR was ranked 123 out of 157 countries, with an index score of 2.1. While Lao PDR's score has increased since 2010, it remains one of the lowest ranked countries in the region and below the developing country average of 3.44.

Table 9. ICT services indicators for East Asian countries

	ICT Development Index				ICT Price Basket (% GNI per capita)	
	Score		Ranking		Score	Ranking
	2010	2012	2010	2012	2012	2012
Brunei Darussalam	4.85	5.06	52	58	1.0	26
Cambodia	1.88	2.3	119	120	24.3	130
Indonesia	3.01	3.43	97	97	5.5	104
Lao PDR	1.84	2.1	120	123	37.4	144
Malaysia	4.63	5.04	57	59	1.8	51
Myanmar	1.65	1.74	129	134	n/a	n/a
Philippines	3.04	3.34	94	98	9.0	113
Singapore	7.47	7.65	10	15	0.4	3
Thailand	3.29	3.54	89	95	3.4	78
Vietnam	3.41	3.8	86	88	6.0	106
World (avg)		4.35				
Developing countries (avg)		3.44				

Source: ITU, *Measuring the Information Society* (2012, 2013).

107. Lao PDR is one of the countries with most expensive ICT services in the world. Indeed, Lao PDR is ranked 144 out of 166 countries for ICT price basket, which represents an average of fixed telephone, mobile cellular and fixed broadband sub-baskets (Table 9). The low performance of Lao PDR in terms of ICT affordability highlights the need for further liberalization and for progress in the removal of restrictive and anti-competitive practices. Indeed, interviewees from the private sector complained about anticompetitive practices toward foreign providers. For example, Lao PDR Telecom (the public provider) regulates minimum prices, above prices charged in Thailand (5 or 6 times higher) or Vietnam, for example, that prevent the foreign providers to compete in prices. They also limit promotions or special offers to two weeks with prior approval. There were also issues reported with the international gateway through which international phone traffic passes through. The government in Lao PDR created a “Lao Gateway”, and all international traffic needs to pass through that gateway, meaning that the costs moved from 3 cents to 6.5 cents for calls into Lao PDR.

108. Lao PDR also lags behind its regional comparators in terms of access to ICT. In 2013, for example, the number of fixed telephone subscriptions per 100 people in Lao PDR was 1.8, compared to 11.4 in Vietnam and 4 in Cambodia (Table 10). Lao PDR also underperformed in terms of mobile subscriptions per 100 people, with 101.9, compared to 149 in Vietnam, 132 in Cambodia, and 106 in the Philippines. Similarly, the percentage of households with internet access in Lao PDR (5.1 percent) is lower than in all other countries in ASEAN, except for Cambodia (3.9 percent) and Myanmar (1.8 percent).

Table 10. Access to internet services in East Asian countries

	Fixed-telephone subscriptions*	Mobile subscriptions*	% households with computer	% households with internet access
Brunei Darussalam	17.2	113.8	86.9	72.4
Cambodia	4	132	5.4	3.9
Indonesia	15.5	115.2	15.1	6.5
Lao PDR	1.8	101.9	8.7	5.1
Malaysia	15.7	140.9	66.9	64.7
Myanmar	1.1	11.2	2.3	1.8
Philippines	4.1	106.8	16.9	18.9
Singapore	37.8	153.4	87.7	87.7
Thailand	9.1	120.3	26.9	18.4
Vietnam	11.4	149.4	17.5	15.6

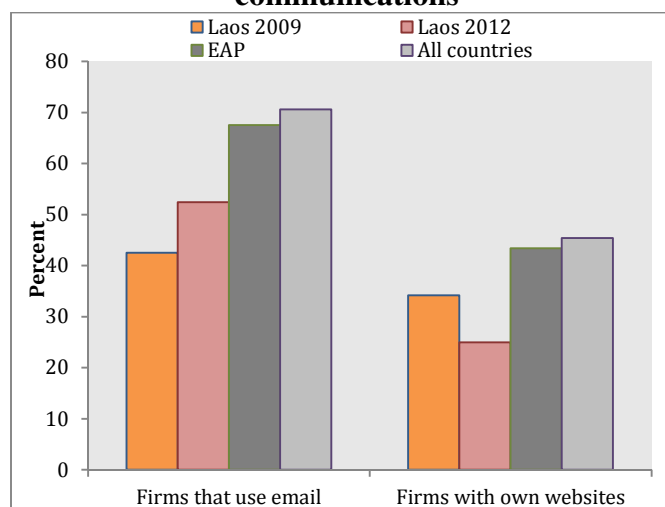
*per 100 population. Source: ITU, *Measuring the Information Society* (2013)

109. Moreover, data from the Enterprise Surveys suggests that firms in Lao PDR have more limited access to internet services than businesses in other countries. For example, less than 47 percent of Lao PDR firms reportedly rely on email for communications, compared to 67.5 percent for other EAP countries and to 71 percent for the cross-regional sample. Only 30 percent of firms in Lao PDR have their own websites, compared to 43 percent of firms in EAP and 45 of firms in the larger sample (Figure 37). This may not reflect restricted access but demand factors, such as whether clients and other business partners rely on these means of communications. However, evidence from interviews further confirmed the inadequacy of internet services, in addition to its high cost. That the fact that internet is considered a luxury good in the tax system, and hence it is taxed at 10 percent, increases costs for a service that is crucial for innovation. This classification dates from 10 years ago but has not yet been changed.

110. The high cost of internet hampers the prospects of the tourism sector to upgrade and to secure higher revenues per tourist, which remain low. Access to high quality ICT is crucial to improve the competitive edge of Lao PDR in tourism and increase the expenditures per day of tourists. ICT plays a role in the pre-travel, in the travel and in the post-travel phase. In the pre-travel it provides a range of tools to facilitate information search, about the region and to create travel plans. During the travel phase, it helps with real-time information about the destination – through mappings of the cities or regions, through information about events and

places of interest, and in the post-travel phase provides tourists a variety of solutions to share their travel experience with others, being an important promotion platform.²¹

Figure 37. Percentage of firms that rely on email and their own websites for communications



Source: Enterprise Surveys, World Bank

v. Determinants of cross-firm variation in perceptions

111. Perceptions of the quality of services provision vary across types of firms. Compared to other firms in EAP, firms in Lao PDR perceive access to finance (20 percent) more negatively after controlling for differences in firm characteristics, and (12 percent) more favorably than the average firm across all countries considered. As it is typically the case across different countries, foreign firms operating in Lao PDR are less vulnerable to constraints in accessing finance, than domestic counterparts of the same size, and in the same sector (Table A5). All else equal, manufacturing firms in Lao PDR also appear to be more constrained by access to finance than firms in other sectors. The greater sensitivity of manufacturing firms in terms of access to finance is also observed for the average firm in EAP and in the cross-regional sample. Moreover, in Lao PDR size does not seem to affect firms' valuation of financial services. In EAP, in contrast, as in the broader sample, size is negatively associated with perceptions on access.

112. Lao PDR exporters tend to have less favorable perceptions of the quality of electric services. Firms in the manufacturing sector also seem to assess the quality of electricity more negatively than their counterparts in other sectors. The greater sensitivity of exporters and manufacture producers to the quality of electricity provision is also observed in EAP and in the larger sample of all countries. More experienced firms, conversely, seem to be less constrained by inadequate electricity provision.

²¹ See Baladin, S. and S. Laizane (2013)

113. Exporters in Lao PDR and in EAP are also more constrained than non-exporters by inadequacies in transportation services. Foreign firms operating in Lao PDR and in EAP countries, however, appear to have more positive perceptions of the quality of transport services. Indeed, all else equal, foreign firms in Lao PDR perceive transport services 20 percent more favorably than domestic firms. By contrast, when considering the larger cross-country sample, foreign firms tend to have a more negative assessment of the constraints posed by transport services.

c. Effects of Services Sector Performance on Firm Performance

114. How does the quality service provision affect the performance of downstream firms in Lao PDR? In this section, we investigate the extent to which the performance of firms in Lao PDR is affected by difficulties in procuring services inputs.²²

115. We begin by exploring the relationship between performance and different firm characteristics. In line with the literature, we expect a number of factors to correlate positively with labor productivity and TFP (two measures of performance), including exporter status, firm size, and foreign ownership. Our results, presented in Table A 6, largely conform to these theoretical expectations.

Box 12: Estimating the Impact of Services Inputs Quality on Firms' Performance

How do access to quality services inputs affect firms' performance? Answering this question requires access to a dataset on the basis of which we can obtain comparable measures of quality services input provision and of firms' performance. Then, it is necessary to test whether a systematic relationship exists between the two. Our approach follows that of Arnold, Mattoo and Narciso (2006).

The dataset comes from the World Bank Enterprise Surveys. Data from these surveys are available for a cross-section of firms from 205 country-year combinations (133 countries are surveyed, with some countries being surveyed in more than one year, of which 14 are in the East Asia and Pacific region (including Lao PDR)). The surveys were undertaken between 2006 and 2014.

The measure of firms' performance chosen is productivity. We use two alternative measures: (i) labor productivity (the ratio of output to total labor costs), and (ii) total factor productivity (TFP-R) estimated in two as a residual of a Cobb-Douglas production function, with output as a function of the capital stock, labor and intermediate inputs.

The performance of services sectors is also obtained from the Enterprise Surveys. We used subjective measures of local services performance, which are firms' valuations as to how much of a constraint they consider electricity, telecommunications, transport, and access to finance for their businesses. Firms are asked to select, on a scale from 0 to 4, whether they consider each of these dimensions to be not an obstacle for their operations (0), a minor obstacle (1), a moderate obstacle (2), major obstacle (3) and severe obstacle (4).

The empirical strategy consists in regressing the measure of productivity on measures of the performance of services, controlling for factors that are typically identified in the literature as relevant for firms' performance, which include firm's export status, firm's size, and firm's age. In addition, we control for country-year fixed effects, to eliminate the potential of distortions due to changes in the relative values of the different currencies in which output, wages, intermediates and capital stock are expressed and to eliminate the effect of country-year

²² We use firm-level data from the Enterprise Surveys, which contain information on firms' inputs and outputs, which we use to calculate two distinct measures of firm productivity: labor productivity and total factor productivity (TFP). We estimate TFP as a residual of a Cobb Douglas production function, with real output as a function of capital, labor, and intermediate inputs (See Box 7 for more details on methodology).

unobservables that may affect both productivity and the perception of services' quality, as well as sector fixed effects to control for time-invariant and sector-specific unobservables.

Concerns about endogeneity arise because it is possible that poor performance affects firms' perceptions about the obstacles that services input provision represent. This would imply a bias upwards in the coefficient linking services performance with productivity. This makes a specification that links firm-level perceptions of services quality with firm-level productivity inappropriate. Our strategy, following Arnold et al (2006) consists in aggregating the individual firm's responses to the services-related questions on the right hand side at the regional level, within each country. This reduces the influence that an individual firm's performance has on the regressor. In addition, it is likely to better summarize the quality provision of services in a given region. Still, and given the structure of the dataset, it is likely that some endogeneity sources remain. For this reason results should be read as indicative of conditional correlations rather than of causation.

The chosen specification is as follows:

$$\mu_i = \alpha_{ct} + \gamma_s + \beta \text{Serv Performance}_r + \pi X_i + \varepsilon_i \quad (1)$$

where μ is the indicator of productivity (labor productivity or residual from Cobb Douglas), α is a country-year fixed effect, γ is a sector fixed effect, ServPerformance is a vector of subjective and objective indicators of obstacles represented by access to finance, electricity, transport, and telecommunications, that vary at the regional level, X is a vector of controls varying at the firm level, and ε is an error term assumed orthogonal to the regressors.

116. Productivity performance is heterogeneous across firms. As typically found in the literature, firms that are more integrated in the global marketplace show productivity premia when compared to others in the same country, same sector, and comparable size (Table A 6). For example, in Lao PDR, exporters are almost 40 percent more productive than non-exporters, when focusing on TFP. The exporter premium is much stronger when focusing on firms in the EAP region and in the larger cross-regional sample. Indeed, compared to their counterparts in EAP and in all other countries, exporters from Lao PDR are less productive.²³ Foreign-owned firms are also substantially more productive than domestic firms, and this effect appears to be stronger for firms in Lao PDR. In addition, firm size matters. Larger firms are slightly more productive than smaller ones, with this premium being slightly larger for firms in Lao PDR than for the average firm in the EAP region and in the complete sample of 133 countries.

117. We then consider the effects of different types of services on firm productivity, using both subjective and objective indicators. To avoid potential problems of endogeneity between firm perceptions of service provision and performance, we aggregate firm-level responses into regional averages. We then regress firm TFP and labor productivity on subjective measures (regional averages) and objective indicators of service performance, using the firm characteristics mentioned above – exporter status, foreign ownership, size, and age—as additional covariates, and controlling for industries, countries, and years. We focus on each type of service independently first and then consider them simultaneously.

118. Firms' productivity is associated with poor services provision. Overall, our results show that the quality of financial, electricity, transport, and telecommunications services provided to downstream firms, measured both through subjective and objective indicators, is systematically associated with firm's performance significantly. The findings are relatively

²³ When adding an interaction of Lao PDR and exporter to the models in columns (2) and (3), the estimated coefficient for this term is significant and negative.

robust when using alternative measures of performance (labor productivity or TFP) and are consistent with the view that services matter for the performance of firms across all sectors of the economy.

i. Finance

119. There is a negative association between perceptions of inadequate access to finance and firm productivity, although the statistical significance of this relationship is less robust, especially when focusing only on Lao PDR. Results in Table A 7 show that, for the larger sample of countries, there is a negative association between firms' perceptions of poor access to finance and total factor *and* labor productivity. The negative relationship between finance performance ratings and labor productivity is also evident when considering EAP countries. However, when focusing only on Lao PDR, all else equal, firms that complain about the poor quality of financial services appear to be *more* not less productive than those that don't. This may be reflecting the fact that more sophisticated firms with more complex financial needs place greater emphasis on an efficient and well-functioning financial market.

120. In practice, firms that have greater access to bank financing tend to be more productive. Results in Table A 8 show the links between objective indicators of access to finance and productivity. For EAP and for the sample of all countries, we find a negative association between higher reliance on internal funding for investments in fixed assets and in working capital and TFP (Columns 1, 2, 4, and 5). In addition, our results show that the greater the percentage of investment that firms finance with bank loans, the higher their TFP, suggesting that firms that have greater access to bank financing are more productive (Columns 3 and 6). Focusing on the LAO PDR sample, however, only the extent of reliance on internal funds for working capital appears to have a statistically significant (and negative) effect on total factor productivity (Column 7).²⁴ Reliance on bank financing for working capital investments, in turn, is associated with higher levels of productivity.²⁵

ii. Electricity & water

121. Inadequate access to electric power also constrains firms' productivity. The results in Table A 9 show that negative perceptions about the quality of electricity provision are associated with lower levels of total factor productivity, both for the cross-regional sample and, more clearly, for firms in EAP. The estimated coefficient on the obstacle perception is also negative when we look at the Lao PDR-specific sample (Column 1), although the effect is blurry, from a statistical point of view, very likely due to the small size of the sample. In these regressions, we control for the fact that some firms have their own generators, which may affect their perceptions

²⁴ These estimated relationships, however, are not robust to alternative measures of productivity. We find that, in Lao PDR, higher reliance on internal funds for investment is associated with higher levels of labor productivity.

²⁵ Whereas for EAP and the whole sample, bank financing for both working capital and fixed assets investments are associated with higher productivity (the estimated coefficients are positive and significant), in Lao PDR, only bank financing for working capital has a statistically significant (positive) effect on TFP.

on the quality and distribution of electricity.²⁶ These results are robust to alternative measures of productivity. Indeed, as the results in column (4) and (5) show, the estimated coefficient for electricity obstacle is negative and significant both in the Lao PDR and in the EAP models. Specifically, if Lao PDR's average perceptions rating for electricity (1.35) improved to Chinese levels (0.48), labor productivity of Lao PDR firms would increase by 4 percent.

122. The productivity losses associated with unreliable electricity services are also evident when considering objective indicators (Table A 10). Our results show a significant negative relationship between the number of outages that a firm experiences in a typical month and its productivity. Indeed, for firms in EAP, each additional power outage is associated with a decrease in TFP of 1 percent. For firms in Lao PDR, this effect seems to be much stronger. Our findings indicate that bringing the median number of power outages experienced in Lao PDR from 2 to 1 (the median experienced in EAP) would increase productivity by 9 percent – a sizable increase. For the larger cross-country sample, the effect of power outages on productivity, while negative and significant at the 1 percent level, is substantially weaker. However, for the larger sample, we also find a significant association between the average duration of each outage and firm performance.

123. The availability and continuity in water provision is also associated with firm productivity. The results in Table A 11 show that both for firms in Lao PDR and for the larger sample of EAP countries, the number of water supply incidents experienced by a firm in a typical month is associated with lower levels of TFP. Specifically, for firms in Lao PDR, one additional water supply interruption results in a productivity loss of 3 percent, compared to less than 0.5 percent for the average EAP firm. For East Asian firms, the duration of water outages also appears to have a negative and significant incidence on productivity.

iii. Transportation

124. Inadequate transportation is strongly associated with firm productivity in Lao PDR. The results in Table A 12 show that perceptions of poor quality in transport services are associated with a productivity loss of more than 50 percent for firms in EAP. For firms in Lao PDR, the productivity losses associated with transportation constraints are much stronger. In fact, if perceptions of the quality of transportation services in Lao PDR were to match Indonesia's (average rating = 0.83 vs. 0.98 for Lao PDR), firms' total factor productivity would increase by 31 percent. Focusing on labor productivity, the estimated coefficient of transport obstacle is also negative and significant but smaller. Thus, if transportation quality perceptions in Lao PDR improved to Indonesian levels, labor productivity of local firms would grow by 1.3 percent.

²⁶ We also find that the more negative perceptions about the quality of electricity services, the more likely a firm in Lao PDR (and in EAP) is to get its own generator.

iv. Telecommunications

125. Access to internet connectivity is associated with higher productivity of firms in Lao PDR. While data on subjective measures is not available for Lao PDR, we focus on two objective indicators of internet access, whether the company uses emails in communications with clients and suppliers, and whether it has its own website. Our results, presented in Table A 13, indicate that Lao PDR firms that rely on emails for their communications are over 110 percent more productive (in terms of TFP) than those that don't. Similarly, while firms that use their own websites to communicate with potential clients and suppliers have a 40 percent higher TFP levels than those that don't. The productivity premium from using email services seems to be stronger for the average firm in the EAP, but slightly lower for firms in the cross-regional sample.²⁷ However, interestingly, for Lao PDR firms, email usage is associated with *lower* not higher labor productivity (column 4). For the other two samples, in contrast, while email reliance appears to have a smaller substantive effect on labor productivity than on TFP, this effect remains positive.

126. Our findings thus confirm the links between quality of backbone services and firm productivity in Lao PDR and beyond. Focusing on Lao PDR in particular, our results indicate that firms' performance is particularly affected by the quality of transportation and electricity services, while less conclusive evidence is found regarding the links between access to finance and productivity. Indeed, when considering indicators of all types of obstacles simultaneously (Table A 14), we observe that the quality of transportation services appears to have the strongest negative effect on firm productivity (measured in terms of total factor productivity and labor productivity). This is also in line with the findings in Box 3.

127. In Table 11, we summarize the results from the statistical analysis, including the magnitude of the estimated effects of services quality on performance. We report standardized coefficients that allow us to better compare effects on firm performance due to changes in the variable that measures constraints. This is because standardized coefficients measure changes in the dependent variable associated with a one-standard deviation change in the explanatory variable. We find, first, that inadequate quality of services appears to be a stronger constraint in Lao PDR than in other countries in the East Asia Pacific region. In addition, the results confirm that changes in the quality of transportation and electricity services would have the largest effect on firms' performance. Specifically, a one standard deviation increase in firms' subjective rating of the quality of transportation is associated with a 15 percent increase in performance (measured as TFP-R). Moreover, a standard deviation decrease in the number of power outages experienced by a firm in a typical month would result in a 13 percent improvement in performance levels.

Table 11. Summary of results from regressions

<i>Type of Service</i>	<i>Indicator</i>	<i>Expected effect on productivity</i>	<i>Findings for Lao PDR (TFP)</i>	<i>Findings for EAP (TFP)</i>
Access to finance	Subjective Perceptions of obstacle	Negative	0.23*	0.22
	Objective			

²⁷ Of course, these results do not imply that internet connectivity causes productivity to be 110 percent higher. Rather, while internet connectivity is likely to have a positive impact on productivity, it is also the case that more sophisticated firms, that may also happen to be more productive, use internet more intensively.

	Reliance on internal funds	Negative	-0.15*	-0.08*
	Reliance on bank finance	Positive	0.15	0.11*
Electricity	Subjective Perceptions of obstacle	Negative	-0.008	-0.02 *
	Objective Power outages	Negative	-0.13*	-0.05*
Transportation	Subjective Perceptions of obstacle	Negative	-0.15*	-0.06*
	Objective n/a	n/a	n/a	n/a
Telecommunications	Subjective n/a	n/a	n/a	n/a
	Objective Email users Website	Positive Positive	0.39* 0.30*	0.25* 0.17 *

Note: Standardized coefficients from regression models reported in Tables A5-A14. *Indicates estimated coefficient is statistically significant (p< .10)

Box 13: Using Panel Fixed Effects Model to Assess Impact of Services Quality on Firms' Performance

The World Bank Enterprise Surveys also contains data for a panel of firms from Lao PDR, which were interviewed in 2009 and in 2012. This is very useful as it allows us to understand how changes in the perceptions of service provision quality are associated with firm's productivity within each firm.

We follow the same empirical strategy, regressing measures of productivity on measure of the performance of services, controlling for observable firm characteristics, and for unobservable characteristics that are fixed over time – captured by the firm-level fixed effect, as well as for sector and year fixed effects. Because we focus on variation in specific firms' assessment of the quality of service provision in time, concerns about endogeneity are weaker. We thus use data on firm-level perceptions of each type of service, instead of regional averages like in the previous specification.

We estimate the following fixed effects model:

$$\mu_{it} = \gamma_s + \beta \text{Serv Performance}_{it} + \pi X_{it} + \varepsilon_{it} \quad (1)$$

where μ is the indicator of productivity (labor productivity or residual from Cobb Douglas), γ is a sector fixed effect, ServPerformance is a vector of perception based indicators of obstacles represented by access to finance, electricity, and transport, that vary in time, X is a vector of controls also varying in time and at the firm level, and ε is an error term assumed orthogonal to the regressors. We also include objective measures of the quality of telecommunications, given the lack of subjective data on these services.

Our results, presented in Table B3.1 show a negative association between firms' perceptions of the quality of services provision and total factor productivity. However, the estimated coefficients for the finance and electricity obstacle variables fail to reach statistical significance. In contrast, perceptions on the quality of transportation services appear to have a significant and negative impact on firm productivity. Specifically, firms that improved their assessment of transportation services in one unit (for example, those that went from seeing transportation as a "severe" obstacle to viewing it as a "major" problem) experienced a productivity boost of 30 percent. Our results also reveal a statistically positive association between access to internet and reliance on ICT services and productivity. On average, firms that switched from not using email to using it for business communications, improve their productivity by 86 percent, while firms which set up a website and start using it to communicate with clients and suppliers experienced a 180 percent growth in TFP.

Other interesting results include the changes in firm productivity associated with switching from focusing on the domestic market to exporting. Firms that started exporting increase their productivity by more than 140 percent. Similarly, all else equal, firms that increase their degree of foreign ownership to 10 percent or higher, experience a significant and substantially large productivity premium.

Table B3.1. Fixed effects model of determinants of productivity

VARIABLES	(1) TFP	(2) TFP	(3) TFP	(4) TFP	(5) TFP	(6) TFP	(7) TFP
Foreign	1.411*** (0.518)	1.399*** (0.519)	1.395** (0.554)	1.776** (0.777)	1.206** (0.591)	1.304** (0.533)	1.373* (0.829)
Exporter	1.426*** (0.498)	1.498*** (0.452)	1.456*** (0.528)	1.658*** (0.310)	1.826*** (0.606)	1.424*** (0.530)	1.793*** (0.424)
Firm size	0.00330 (0.00241)	0.00327 (0.00221)	0.00317 (0.00305)	0.00401 (0.00335)	0.00371 (0.00235)	0.00291 (0.00229)	0.00278 (0.00199)
Firm age	0.0407 (0.0602)	0.0387 (0.0556)	0.0475 (0.0639)	0.0934 (0.0801)	0.0338 (0.0624)	0.0577 (0.0619)	0.0339 (0.0554)
Finance obstacle		-0.133 (0.307)					
Electricity obstacle			-0.0959 (0.825)	-0.362 (0.693)			
Generator				2.212* (1.169)			
Transport obstacle					-0.330* (0.196)		
Email user						0.861** (0.367)	
Website							1.815* (0.925)
Constant	19.18*** (1.368)	19.41*** (1.494)	19.18*** (1.321)	18.41*** (1.678)	19.48*** (1.490)	18.75*** (1.340)	18.45*** (1.157)
Sector dummies	YES	YES	YES	YES	YES	YES	YES
Observations	338	334	338	149	337	338	338
R-squared	0.595	0.602	0.595	0.656	0.619	0.616	0.684
Number of id2009	315	311	315	128	314	315	315
Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1							

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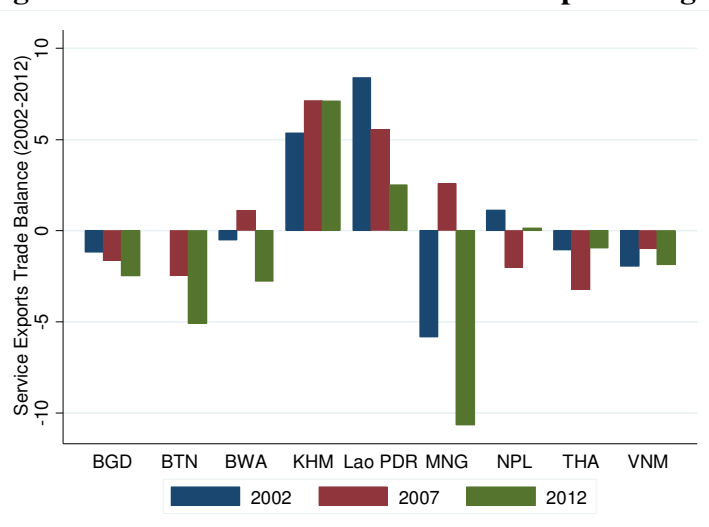
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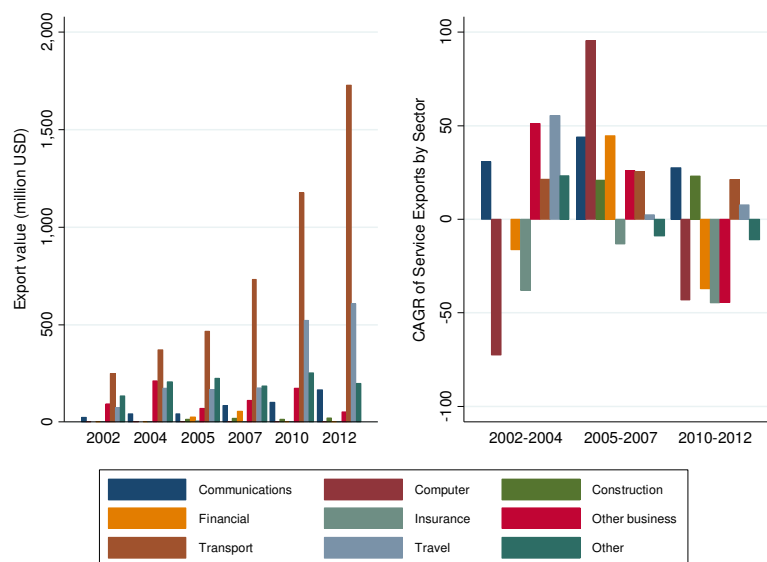
Annex

Figure A 1. Trade balance in services as a percentage of GDP, 2002-2012



Source: Authors' calculations based on data from WDI.

Figure A 2. Services sectoral exports growth, 2002-2012



Source: Authors' calculations based on data from UNCTAD.

Table A 1. Gross and value-added sectoral export shares by type of linkage, 2004-11 (percent)

Sector	Gross exports			VA in exports (backward linkages)			VA in exports (forward linkages)		
	2004	2007	2011	2004	2007	2011	2004	2007	2011
Agriculture & Energy	29.3	35.9	51.9	35.2	42.3	56.3	38.9	45.2	57.3
Manufacturing	17.4	15.8	13.2	16.1	14.5	12.1	4.2	3.5	3.0
Water	0.2	0.2	0.1	0.3	0.2	0.1	0.5	0.3	0.3
Construction	0.0	0.7	0.5	0.0	0.6	0.4	0.0	0.3	0.2
Distribution	5.9	1.7	1.2	6.3	1.8	1.2	12.6	8.6	6.8
Transport	26.2	29.6	21.8	20.0	22.6	18.2	15.0	16.2	13.5
Communications	2.6	3.1	2.2	3.0	3.6	2.3	2.9	3.2	2.2
Finance	0.2	1.4	1.0	0.3	1.7	1.1	2.5	4.0	3.0
Insurance	0.3	0.4	0.3	0.4	0.5	0.3	0.9	1.1	0.8
Business services & ICT	1.8	2.1	1.5	1.8	2.2	1.5	9.1	9.3	7.5
Other consumer services	1.4	0.9	0.7	1.4	0.9	0.6	1.3	1.0	0.7
Other services	14.6	8.3	5.8	15.2	9.2	5.9	12.1	7.4	4.8

Source: World Bank Export of Value Added Database.

Table A 2. CAGR of domestic value-added for Lao PDR and comparators by sector, 2004-2011 (FWD linkages)

Sector	LAO	BGD	BWA	KHM	MNG	NPL	THA	VNM
Agriculture, energy extraction, & minerals	18.4	9.3	6.0	15.5	25.1	15.4	11.0	14.1
Manufacturing	19.3	12.8	8.7	10.1	13.9	10.7	11.6	18.6
Business Services & ICT	21.8	10.2	8.1	12.7	39.7	12.9	10.3	15.3
Communications	20.7	9.7	6.7	7.4	33.8	15.4	11.6	15.1
Construction	17.1	10.0	7.8	9.5	40.3	16.1	12.5	16.1
Distribution	20.1	10.6	7.4	12.6	36.3	13.1	12.0	17.8
Finance	23.5	10.8	5.9	11.9	30.2	12.9	11.7	15.2
Insurance	14.9	10.8	1.2	12.4	30.9	15.7	11.9	9.9
Other consumer services	14.6	10.4	7.4	13.8	42.5	15.3	11.5	15.8
Other services	21.0	9.7	2.6	16.0	34.2	15.4	14.9	17.3
Transport	16.0	10.4	4.9	12.1	26.5	14.2	10.0	23.6
Water	25.7	1.8	7.0	12.0	50.2	15.2	13.2	17.0

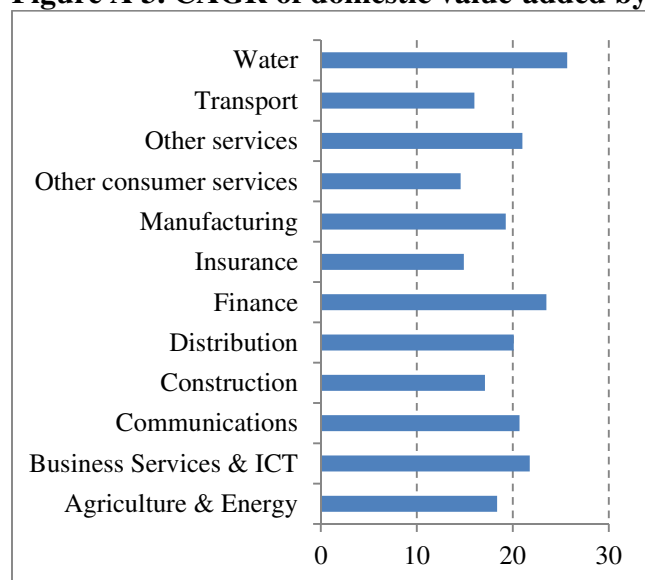
Source: World Bank Export of Value Added Database.

Table A 3: CAGR of value-added in exports for Lao PDR and comparators by sector, 2004-2011 (FWD linkages)

Sector	LAO	BGD	BWA	KHM	MNG	NPL	THA	VNM
Agriculture, energy extraction, & minerals	26.0	12.9	5.7	15.7	25.5	4.7	10.3	13.1
Manufacturing	23.9	15.8	6.8	9.6	0.3	-0.8	11.1	19.4
Business Services & ICT	24.6	10.5	10.0	10.1	20.3	1.7	8.5	12.7
Communications	21.9	9.6	7.3	3.8	21.2	1.6	8.9	12.1
Construction	17.8	12.3	5.4	8.2	25.0	4.6	11.5	9.7
Distribution	31.0	14.4	4.0	10.6	20.7	-3.3	9.2	16.6
Finance	31.0	14.0	1.1	10.6	21.4	3.2	10.2	12.6
Insurance	13.5	13.3	-5.0	10.7	16.5	0.4	9.1	7.0
Other consumer services	7.9	11.6	3.1	9.5	21.3	-1.0	8.8	6.9
Other services	2.7	6.7	2.0	9.7	11.6	3.8	9.4	7.7
Transport	12.5	12.6	2.7	10.8	16.5	0.1	8.0	20.5
Water	42.0	n.a.	3.9	9.3	34.4	1.1	10.5	17.3

Source: World Bank Export of Value Added Database.

Figure A 3. CAGR of domestic value-added by sector (percent), 2004-11



Source: World Bank Export of Value Added Database.

Table A 4

VARIABLES	(1) Exporter	(2) Export share	(3) Export share	(4) Exporter	(5) Export share	(6) Exporter
	ALL	ALL	EAP	EAP	LAO PDR	LAO PDR
	Probit	OLS	OLS	Probit	OLS	Probit
Capital intensity	-1.051*** (0.0794)	-17.40*** (1.409) (2.577)	-41.69*** (5.165)	-1.553*** (0.221)	-37.94 (25.08)	-1.137 (0.897)
Constant	-0.312 (0.253)	21.82*** (2.881)	65.46*** (7.171)	0.856*** (0.265)	58.67** (25.71)	0.398 (0.910)
Country year dummies	YES	YES	YES	YES		
Observations	34,607	34,623	3,649	3,662	377	377
R-squared		0.120	0.061		0.035	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A 5. Valuations of service input provision by type of firms

VARIABLES	(1) Finance obstacle	(2) Finance obstacle	(3) Finance obstacle	(4) Electricity obstacle	(5) Electricity obstacle	(6) Electricity obstacle	(7) Transport obstacle	(8) Transport obstacle	(9) Transport obstacle	(10) Transport obstacle
	LAO PDR	EAP	ALL	LAO PDR	EAP	ALL	LAO PDR	LAO PDR	ALL	EAP
Foreign	-0.275* (0.158)	-0.271*** (0.0427)	-0.284*** (0.0152)	0.194 (0.175)	-0.0415 (0.0487)	-0.00762 (0.0166)	-0.222* (0.130)	-0.281** (0.130)	0.0540*** (0.0150)	-0.0418 (0.0431)
Exporter	0.0859 (0.137)	-0.00245 (0.0399)	-0.0181 (0.0116)	0.237* (0.126)	0.232*** (0.0431)	0.0463*** (0.0125)	0.338** (0.131)	0.315*** (0.121)	0.122*** (0.0112)	0.205*** (0.04)
Firm size	-0.000106 (0.000283)	-7.76e-05** (3.48e-05)	-5.74e-05*** (2.08e-05)	-8.67e-05 (0.000266)	9.56e-05** (4.87e-05)	3.33e-06 (1.16e-05)	0.000815** (0.000330)	0.000766*** (0.000247)	2.89e-05*** (1.08e-05)	7.03e-05* (4.67e-05)
Firm age	-0.0281*** (0.00621)	-0.00425*** (0.00116)	-0.00211*** (0.000424)	-0.0202*** (0.00678)	-0.00138 (0.00124)	-0.00114*** (0.000389)	-0.0135** (0.00649)	-0.00893 (0.00613)	-9.87e-05 (0.000343)	0.0016 (0.00119)
Manufacturing	0.241** (0.120)	0.0911*** (0.0337)	0.126*** (0.00971)	0.251** (0.120)	0.181*** (0.0343)	0.240*** (0.0104)		-0.0235 (0.104)	0.0445*** (0.00938)	-0.011 (0.0336)
Constant	1.502*** (0.106)	1.372*** (0.0599)	1.811*** (0.0611)	1.433*** (0.109)	1.818*** (0.0645)	2.607*** (0.0580)	0.800** (0.328)	0.975*** (0.0970)	1.441*** (0.0646)	1.106*** (0.0597)
Country year dummies		YES	YES		YES	YES			YES	YES
Sector dummies							YES			
Observations	608	6,326	82,209	617	6,528	83,038	605	605	82,667	6,401
R-squared	0.039	0.030	0.136	0.038	0.172	0.191	0.100	0.036	0.111	0.008
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1										

Table A 6. Determinants of total factor productivity

	(1)	(2)	(3)
VARIABLES	TFP	TFP	TFP
	LAO PDR	EAP	ALL
Exporter	0.394*	1.252***	1.305***
	(0.225)	(0.0921)	(0.0377)
Foreign	1.324***	1.394***	1.067***
	(0.212)	(0.109)	(0.0458)
Firm size	0.00440***	0.00156***	0.00141***
	(0.000624)	(0.000290)	(0.000205)
Firm age	-0.00588	0.0268***	0.0152***
	(0.00876)	(0.00386)	(0.000776)
Lao PDR		0.386*	5.40***
		(0.222)	(0.291)
Constant	19.87***	19.77***	15.00***
	(0.395)	(0.123)	(0.207)
Country-year dummies		YES	YES
Sector dummies	YES	YES	YES
Observations	338	1,970	20,673
R-squared	0.457	0.762	0.777
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1			

Table A 7. Subjective measures of access to finance and productivity

VARIABLES	(1) TFP	(2) TFP	(3) TFP	(4) Labor productivity	(5) Labor productivity	(6) Labor productivity
	EAP	LAO PDR	ALL	LAO PDR	EAP	ALL
Exporter	1.256*** (0.0921)	0.589** (0.228)	1.305*** (0.0377)	-0.00820 (0.0104)	-0.00106 (0.00391)	0.0111** (0.00529)
Foreign	1.404*** (0.109)	1.267*** (0.209)	1.065*** (0.0458)	0.00646 (0.00931)	0.01000* (0.00605)	0.0158** (0.00708)
Firm size	0.00155*** (0.000290)	0.00407*** (0.000625)	0.00141*** (0.000205)	5.54e-06 (1.73e-05)	-5.55e-06** (2.27e-06)	-7.70e-06*** (2.19e-06)
Firm age	0.0266*** (0.00389)	-0.000560 (0.00855)	0.0151*** (0.000776)	0.000837* (0.000474)	0.000351*** (0.000110)	-9.97e-05 (7.28e-05)
Finance obstacle	0.245 (0.165)	1.898*** (0.328)	-0.100*** (0.0346)	0.0348** (0.0165)	-0.00937 (0.00657)	-0.0137** (0.00690)
Constant	19.49*** (0.223)	16.99*** (0.623)	15.18*** (0.218)	1.037*** (0.0272)	1.157*** (0.0159)	1.157*** (0.0159)
Sector dummies	YES	YES	YES	YES	YES	YES
Country year dummies	YES		YES		YES	YES
Observations	1,970	338	20,673	602	5,160	64,895
R-squared	0.762	0.500	0.777	0.251	0.138	0.049
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1						

Table A 8. Objective measures of access to finance and productivity

VARIABLES	(1) TFP	(2) TFP	(3) TFP	(4) TFP	(5) TFP	(6) TFP	(7) TFP
	ALL	ALL	ALL	EAP	EAP	EAP	LAO PDR
Exporter	1.185*** (0.0461)	1.298*** (0.0403)	1.154*** (0.0498)	1.212*** (0.114)	1.216*** (0.0904)	1.198*** (0.114)	0.323 (0.215)
Foreign	1.108*** (0.0594)	1.095*** (0.0508)	1.143*** (0.0673)	1.293*** (0.139)	1.505*** (0.107)	1.312*** (0.138)	1.364*** (0.206)
Firm size	0.0012*** (0.000209)	0.00135*** (0.000207)	0.00111*** (0.000205)	0.00131*** (0.000265)	0.00150*** (0.000281)	0.00132*** (0.000263)	0.00457*** (0.000606)
Firm age	0.0182*** (0.00101)	0.0154*** (0.000801)	0.0189*** (0.00105)	0.0242*** (0.00477)	0.0260*** (0.00379)	0.0241*** (0.00475)	-0.00211 (0.00868)
Internal funds (fixed assets)	-0.0013*** (0.000382)			-0.00285** (0.00130)			
Internal funds (working capital)		-0.0024*** (0.000350)			-0.00763*** (0.00123)		-0.0142*** (0.00354)
Bank financing			0.00431*** (0.000476)			0.00530*** (0.00162)	
Constant	15.62*** (0.393)	15.20*** (0.207)	15.48*** (0.391)	20.74*** (0.228)	20.46*** (0.166)	20.45*** (0.204)	21.28*** (0.530)
Sector dummies	YES	YES	YES	YES	YES	YES	YES
Country year dummies	YES	YES	YES	YES	YES	YES	
Observations	9,771	17,937	8,078	940	1,956	939	338
R-squared	0.794	0.772	0.791	0.81	0.768	0.812	0.477
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1							

Table A 9. Subjective measures of electricity services and productivity

VARIABLES	(1)	(2)	(3)	(4)	(5)
	TFP	TFP	TFP	Labor productivity	Labor productivity
	LAO PDR	EAP	ALL	LAO PDR	EAP
Exporter	0.849*** (0.286)	1.160*** (0.0887)	1.236*** (0.0355)	0.00142 (0.0111)	0.000938 (0.00392)
Foreign	1.246*** (0.292)	1.274*** (0.112)	0.998*** (0.0454)	0.0156 (0.0101)	0.00422 (0.00435)
Firm size	0.00322*** (0.000491)	0.00133*** (0.000262)	0.00133*** (0.000196)	9.26e-06 (1.78e-05)	-6.10e-06*** (2.15e-06)
Firm age	0.00524 (0.0123)	0.0253*** (0.00382)	0.0146*** (0.000770)	0.000752 (0.000583)	0.000369*** (0.000117)
Electricity obstacle	-0.0702 (0.520)	-0.500*** (0.182)	-0.0536** (0.0241)	-0.0542** (0.0249)	-0.0247*** (0.00663)
Own generator	0.603 (0.367)	1.000*** (0.0840)	0.690*** (0.0291)	-0.0102 (0.0118)	0.00924*** (0.00327)
Constant	19.67*** (0.798)	20.25*** (0.228)	14.77*** (0.228)	1.158*** (0.0392)	1.214*** (0.0265)
Sector dummies	YES	YES	YES	YES	YES
Country year dummies		YES	YES		YES
Observations	149	1,778	20,163	388	3,657
R-squared	0.594	0.798	0.785	0.204	0.160
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1					

Table A 10. Objective measures of electricity services and productivity

VARIABLES	(1) TFP	(2) TFP	(3) TFP	(4) TFP
	LAO PDR	EAP	EAP	ALL
Exporter	1.110*** (0.328)	1.194*** (0.105)	1.138*** (0.102)	1.185*** (0.0472)
Foreign	2.487*** (0.594)	0.993*** (0.165)	1.038*** (0.137)	0.855*** (0.0722)
Firm size	0.00240* (0.00118)	0.00100*** (0.000213)	0.00123*** (0.000261)	0.00164*** (0.000307)
Firm age	-0.0254 (0.0295)	0.0246*** (0.00491)	0.0267*** (0.00459)	0.0124*** (0.00110)
Length of power outages		0.00812 (0.00733)		-0.000836** (0.000373)
Own generator	0.519 (0.929)	0.843*** (0.110)	0.899*** (0.0987)	0.689*** (0.0425)
Power outages	-0.0951* (0.0547)		-0.0117*** (0.00429)	
Constant	20.59*** (0.612)	20.15*** (0.196)	20.10*** (0.151)	15.09*** (0.311)
Sector dummies	YES	YES	YES	YES
Country year dummies		YES	YES	YES
Observations	36	880	1,184	10,714
R-squared	0.797	0.839	0.830	0.793

Table A 11. Access to water and productivity

VARIABLES	(1) TFP	(2) TFP	(3) TFP	(4) TFP	(5) TFP
	LAO PDR	LAO PDR	EAP	EAP	EAP
Exporter	0.465 (0.363)	1.099 (1.011)	1.056*** (0.0888)	1.012*** (0.0946)	1.012*** (0.0946)
Foreign	1.131*** (0.308)	-0.576 (1.076)	1.055*** (0.113)	0.896*** (0.137)	0.896*** (0.137)
Firm size	0.00324*** (0.000484)	0.00548** (0.00192)	0.00220*** (0.000368)	0.00254*** (0.000280)	0.00254*** (0.000280)
Firm age	0.0154 (0.0154)	0.00715 (0.0350)	0.0170*** (0.00224)	0.0159*** (0.00231)	0.0159*** (0.00231)
Water supply incidents	-0.0349* (0.0196)		-0.00449** (0.00196)		
Length water outages		0.0561 (0.0457)		-0.00453*** (0.00154)	-0.00453*** (0.00154)
Constant	19.70*** (0.479)	20.49*** (0.592)	15.13*** (0.431)	15.20*** (0.460)	15.20*** (0.460)
Sector dummies	YES	YES	YES	YES	YES
Country year dummies			YES	YES	YES
Observations	113	29	2,174	1,741	1,741
R-squared	0.608	0.728	0.800	0.786	0.786
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1					

Table A 12. Subjective measures of quality of transport and productivity

VARIABLES	(1) TFP	(2) TFP	(3) TFP	(4) Labor productivity	(5) Labor productivity
	LAO PDR	EAP	ALL	LAO PDR	EAP
Exporter	0.540** (0.223)	1.250*** (0.0912)	1.305*** (0.0377)	-0.00691 (0.0105)	-0.00110 (0.00391)
Foreign	1.218*** (0.213)	1.417*** (0.108)	1.067*** (0.0458)	0.00607 (0.00921)	0.0105* (0.00605)
Firm size	0.00411*** (0.000636)	0.00156*** (0.000284)	0.00141*** (0.000206)	-8.87e-07 (1.74e-05)	-5.59e-06** (2.31e-06)
Firm age	-0.00644 (0.00860)	0.0271*** (0.00388)	0.0151*** (0.000777)	0.000863* (0.000474)	0.000350*** (0.000110)
Transport obstacle	-2.195*** (0.581)	-0.645*** (0.144)	0.0437 (0.0346)	-0.0895*** (0.0184)	-0.0173*** (0.00504)
Constant	21.61*** (0.611)	20.26*** (0.160)	14.94*** (0.216)	1.167*** (0.0247)	1.167*** (0.0157)
Sector dummies	YES	YES	YES	YES	YES
Country year dummies		YES	YES		YES
Observations	338	1,970	20,673	602	5,160
R-squared	0.477	0.765	0.777	0.271	0.139
Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1					

Table A 13. Internet connectivity and productivity

VARIABLES	(1) TFP	(2) TFP	(3) TFP	(4) Labor productivity	(5) Labor productivity	(6) Labor productivity
	LAO PDR	EAP	ALL	LAO PDR	EAP	ALL
Exporter	0.344*	0.780***	0.967***	-0.00798	-0.00271	0.00994*
	(0.205)	(0.0830)	(0.0313)	(0.0107)	(0.00414)	(0.00593)
Foreign	0.750***	1.100***	0.938***	0.0134	0.00914	0.0150**
	(0.205)	(0.0994)	(0.0431)	(0.00967)	(0.00609)	(0.00722)
Firm size	0.00340***	0.00133***	0.00125***	1.87e-05	-6.11e-06***	-8.17e-06***
	(0.000518)	(0.000223)	(0.000177)	(1.83e-05)	(2.32e-06)	(2.30e-06)
Firm age	-0.00177	0.0196***	0.0132***	0.000624	0.000330***	-0.000102
	(0.00870)	(0.00331)	(0.000708)	(0.000470)	(0.000111)	(7.24e-05)
Email users	1.199***	1.318***	0.883***	-0.0218**	0.00735**	0.0157***
	(0.180)	(0.0864)	(0.0306)	(0.00878)	(0.00333)	(0.00605)
Website	0.391**	0.652***	0.718***	0.00600		-0.00420
	(0.197)	(0.0822)	(0.0276)	(0.00917)		(0.00438)
Constant	18.80***	19.47***	14.76***	1.101***	1.143***	1.123***
	(0.306)	(0.108)	(0.199)	(0.0169)	(0.0149)	(0.00836)
Sector dummies	YES	YES	YES	YES	YES	YES
Country year dummies		YES	YES		YES	YES
Observations	338	1,965	20,360	600	5,149	64,101
R-squared	0.562	0.812	0.807	0.254	0.138	0.049
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						

Table A 14. Perceptions-based indicators and productivity

VARIABLES	(1) TFP	(2) TFP	(3) TFP	(4) Labor productivity	(5) Labor productivity
	LAO PDR	EAP	ALL	LAO PDR	EAP
Exporter	0.510** (0.230)	1.256*** (0.0913)	1.305*** (0.0378)	-0.00548 (0.0104)	-0.00124 (0.00391)
Foreign	1.236*** (0.211)	1.433*** (0.108)	1.062*** (0.0465)	0.00769 (0.00892)	0.0104* (0.00601)
Firm size	0.00407*** (0.000629)	0.00156*** (0.000282)	0.00141*** (0.000205)	-1.20e-06 (1.74e-05)	-5.97e-06** (2.32e-06)
Firm age	-0.000565 (0.00854)	0.0268*** (0.00391)	0.0154*** (0.000807)	0.000715 (0.000470)	0.000350*** (0.000110)
Transport obstacle	-1.649* (0.878)	-0.797*** (0.158)	0.0811* (0.0461)	-0.0593* (0.0347)	-0.00438 (0.00849)
Finance obstacle	0.407 (0.706)	0.258 (0.189)	-0.227*** (0.0430)	0.0206 (0.0306)	0.00155 (0.00657)
Electricity obstacle	1.341** (0.572)	0.276 (0.219)	0.125*** (0.0278)	-0.0588** (0.0262)	-0.0245** (0.0108)
Constant	18.66*** (1.255)	19.77*** (0.246)	14.99*** (0.227)	1.196*** (0.0563)	1.188*** (0.0180)
Sector dummies	YES	YES	YES	YES	YES
Country year dummies		YES	YES		YES
Observations	338	1,970	20,446	602	5,160
R-squared	0.508	0.765	0.778	0.280	0.140
Robust standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

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